Being Friendly is Difficult

Psycholinguistic Experiments on Agentivity in Copular Constructions

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Abstract

Agentivity in copular constructions such as *Sophia is being friendly*, compared to its non-agentive counterpart *Sophia is friendly*, is a phenomenon that has received some attention in the theoretical debate but has not been widely investigated in psycholinguistics. The implications of Sophia's voluntary control over her deliberate actions, which arise in the former sentence, seem to stem from the interplay between the subject, the verb, and the adjective. Truthfully, there is not much more to the sentence itself. In comparison, *Sophia is friendly* can be interpreted both as a state and as an event.

Neither the predicate nor the verb in isolation can explain how agentivity comes about. Furthermore, the restrictions on the utterance's agent are vague and flexible. Two theoretical accounts explain the agentivity effect by means of either underspecification or coercion. According to the Underspecification Account, the copula is semantically undetermined and adapts to the requirements of its lexical context as they arise. The adjectival predicate dictates the availability of the agentive interpretation. The Coercion Account postulates that the copula is lexically stative. The state interpretation of the copula-predicate combination is constructed compositionally, but the agentive reading is the result of reinterpreting the utterance as an activity.

Underspecification and coercion are reflected in differing ways during processing. The former is effortless, whereas the latter elicits an increase in processing effort and a decrease in naturalness or sensicality. In a series of offline and online experiments on German copular sentences, the predictions of the Underspecification Account and the Coercion Account are put to a test. The results point to the stative nature of the copula, in line with the Coercion Account's hypothesis. The availability of an adjective's agentive interpretations appears to hinge on the specific circumstances. However, some degree of uncertainty remains in relation to the subtle nature of agentive coercion effects.

Dedication

To Aleks, Bran, Emilia, and Julian ♡

Declaration

Ich erkläre hiermit, dass ich die zur Promotion eingereichte Arbeit mit dem Titel: "Being Friendly is Difficult" selbständig verfasst, nur die angegebenen Quellen und Hilfsmittel benutzt und wörtlich oder inhaltlich übernommene Stellen als solche gekennzeichnet habe. Ich versichere an Eides statt, dass diese Angaben wahr sind und dass ich nichts verschwiegen habe. Mir ist bekannt, dass die falsche Abgabe einer Versicherung an Eides statt mit Freiheitsstrafe bis zu drei Jahren oder mit Geldstrafe bestraft wird.

I hereby declare that I have independently written the dissertation entitled "Being Friendly is Difficult", that I have used only the sources and aids indicated, and that I have marked passages taken verbatim or in content as such. I declare in lieu of an oath that this information is true and that I have not concealed anything. I am aware that making a false declaration is punishable by imprisonment of up to three years or a fine.

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All remaining errors are proudly my own.

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List of Abbreviations

Accom	Accomplishment
Achiev	Achievement
Ag	Agent thematic role
AMF	Anterior midline field
AP	Adjectival phrase or adverbial phrase
ARG, Arg	Argument
ATC	Anterior temporal cortex
ATL	Anterior temporal lobe
AUX	Auxiliary
C	Complementizer
CA	Coercion Account
cf.	Confer (compare)
CI	Confidence interval
CP	Complementizer phrase
df	Degrees of freedom
DP	Determiner phrase
DRS	Discourse Representation Structure
DRT	Discourse Representation Theory
e.g.	Exempli gratia (for example)
EEG	Electroencephalography
ELAN	Early left anterior negativity
ERP	Event related potential
Est.	Estimate
ET	Eye-tracking
et al.	Et alii/aliae (and others)
etc.	Et cetera (and other similar things, and so forth)
Exp	Experiment
fMRI	Functional magnetic resonance imaging
GEN	Generic
i.e.	Id est (that is/this means)
I	Inflection
I'	I-bar
IA	Interest area
ID	Identifier
ILP	Individual level predicate
Infl	Head of inflectional phrase
IP	Inflectional phrase

LAN	Late anterior negativity, an ERP component
Lexem	Lexical semantic complexity
LH	Left hemisphere
LIF	Left inferior frontal
LOC	Location
Max	Maximum
MEG	Magnetoencephalography
Min	Minimum
ms	Milliseconds
N	Noun
n/a	Not applicable
NP	Noun phrase
N400	An EEG component
OVS	Object verb subject
p	Significance level
PP	Prepositional phrase
PRES	Present
PRO	Pronominal determiner phrase
PROG	Progressive
psych	Psychological
P600	An EEG component
REAL	Realization relation
reg	Regression
RT	Reading time or response time
S	Sentence
SAP	Sustained anterior positivity, an ERP component
SD	Standard deviation
SE	Standard error
Semel	Semelfactive
sen	Sensicality
SLP	Stage level predicate
SPR	Self-paced reading
SUBJ	Subject
SVO	Subject verb object
$\mathbf{t}_{1,2}$	T value of the paired t-test (by subjects and by items, respectively)
UA	Underspecification Account
V	Verb
V'	V-bar
vmPFC	Ventromedial prefrontal cortex
VP	Verb phrase
vs.	Versus (against)
w/	With

List of Symbols

$*$	Ungrammatical sentence or significant effect
?	Semantically or pragmatically marked sentence
??	Strongly semantically or pragmatically marked sentence
#	Ungrammatical sentence that was repaired
—	Does not apply, is not included or no effect
✓	Success, no conflict
✗	Failure, conflict
🗘	Possible reinterpretation
$\rightarrow$	Conditional, direction or conclusion
$\leftrightarrow$	Biconditional
$\uparrow$, LIFT	lifting function
β	Regression coefficient estimate
λ	Lambda operator
τ	Function mapping situations and K-states onto time intervals
Θ	Theta-role, thematic role
$\exists$	Existential quantifier
$\forall$	Universal quantifier
$\neg$	Negation
$\wedge$, &	Conjunction relation
$\vee$	Disjunction relation
$\cup$	Union relation
$\equiv$	Equivalence relation
$\in$	Contact relation
$\sqsubseteq$	Partial order relation
$\subset$	Proper subset relation
$\subseteq$	Subset relation
$\circ$	Overlapping relation
$[\![\ldots]\!]$	Denotation brackets
$\langle\ldots\rangle$	Argument list brackets

1 Introduction

Dear reader, meet Sophia. She will be your guide through this dissertation. Sophia is friendly or maybe she is just being friendly. This will be revealed by the last chapter, so please be patient.

Sophia's friendliness may be passive or active. If friendliness is in her character, she is usually and effortlessly friendly, as in (1a). If instead Sophia is only being friendly, as in (1b), then perhaps this behavior is out of character and she is investing a lot of effort to act this way. In this case, she is purposely and deliberately controlling her own behavior. This volitional control of Sophia's actions in (1b) compared to (1a) is the *agentivity effect*.

Interestingly, there are limits on what Sophia can get away with. Being intelligent and having retired are long-lasting traits that one cannot start and stop at will.[1] Nevertheless, some comparatively brief attributes are equally unchangeable from within, like (1c) vs. (1d).

(1) a. Sophia is friendly/noisy/intelligent/retired.
    b. Sophia is being friendly/noisy/*intelligent/*retired.
    c. The children are quiet/asleep.
    d. The children are being quiet/*asleep.

(2) a. The river is noisy/dirty/*friendly.
    b. The river is being *noisy/*dirty/*friendly.
    c. ?The river is being noisy after last night's torrential downpour.
    d. ?The river is being friendly again after the evil spirit was exorcised.

Moreover, it is not enough for the subject's property to fulfill certain requirements. The subject (or agent) must also be able to exert power over their behavior. The river may be noisy and polluted by unscrupulous industrialists, but it cannot be friendly. The agentive interpretations of noisiness,

[1] I use * to express ungrammaticality, ? and ?? to indicate marked and strongly marked sentences, and # to signal resolved ungrammaticality.

dirtiness, and friendliness are also unavailable. However, when the ungrammatical examples in (2b) are given enough contextual support, a plausible, if eye-catching, interpretation is possible, as in (2c)–(2d) (examples adapted from Partee (1977)).

How the agentive interpretation of copula predicate sentences like (1)–(2) is accomplished is at the heart of this thesis. It appears that the agentivity in copular sentences arises from the interplay between all of the elements of the sentence: the subject, the verb, and the predicate complement. Curiously, there is little research into the mechanisms underlying agentivity and there are no empirical studies on agentive coercion. A thorough investigation of the drastic shift in meaning between the sentences in (1)–(2) is long overdue and this thesis aims to correct this oversight. Distinguishing true friendliness from forced cordiality is as relevant today as ever before.

In the following chapters, with Sophia's help, we delve into what is known about agentivity in copular constructions, what is still unclear, and how we can empirically explore the unknown. The contributions of the (adjectival) predicate (Chapter 2) and the copula (Chapter 3) are studied individually, before shifting the focus to their interaction (Chapters 4 and 5). Next, two central theories that explain the emergence of agentivity in copular constructions are put to the test in a series of offline and online experiments (Chapters 6–9), before finally revealing how the agentive interpretation of sentences like those in (1) comes about.

2
The Predicate

We begin with the predicate, i.e. the *friendly* part of Sophia. Adjectival predicates are the focus of this dissertation; therefore, other predicates must take a back seat. This chapter explores two major questions relating to adjectival predicates. First, is it possible to formally distinguish between predicates such as *friendly* and *intelligent* in (1) and (2), and if so how? Secondly, how do theories concerning predicate types explain the dichotomy between *friendly* and *intelligent*, if there is one?

Predicates like *friendly*, *noisy*, *available*, *hungry*, *tired*, which typically express transient, episodic properties, are called stage-level predicates (SLPs). Predicates like *talented*, *intelligent*, *insane*, *altruistic*, *married*, which express essential, long-lasting properties are called individual-level predicates (ILPs). The predicates that can function as ILPs and SLPs span different adjectival categories; for a detailed overview of which adjectives can function as SLPs and ILPs, see Kotowski (2016).

The reader will be quick to notice that the distinction between transient and essential is crude at best. Being friendly may be an essential characteristic of Sophia, whereas being married may be a short-lived affair. Are there reliable ways of distinguishing between the two?

2.1 Distinguishing Between Stage-Level and Individual-Level Predicates

The lines between individual-level and stage-level predicates are very blurry and tests are often subjective. The general consensus is that individual-level predicates are long-lasting and unchanging, while stage-level predicates are momentary and easy to modify. However, there are many counterexamples to this generalization. For example, being *asleep* (SLP) is not something one can typically voluntarily change from within, while changing from being *blond* to being *dark-haired* (ILP) is easy. To complicate things even further, although many ILPs do not change at all (e.g. being *human*, *christened*, *wooden*), some ILPs can change due to volition (e.g. being *blond*, *Polish*, *Buddhist*), while others change due to necessity (e.g. being *a child*, *alive*, *sane*).

Nevertheless, examining some regular differences between both predicate groups is worthwhile, if only to highlight the limitations of the distinction. Below I present a handful of the most common tests that aim to distinguish ILPs from SLPs and briefly discuss their limitations, but see e.g. Fernald (2000), Jäger (1999), Kotowski (2016), and Maienborn (2003a,b) for an overview and critical review of these tests. The tests are summarized in Table 2.1. Overall, ILPs tend to place more restrictions on the environments in which they appear than SLPs.

2.1.1 Indefinites and Bare Plurals

Carlson (1977) observed that SLPs like those in (3) have an existential reading and a generic one. Under a generic reading, (3a) conveys that Sophia has a very healthy appetite, whereas the existential reading is one where she is presently hungry (i.e. her hunger is anchored in space and time). Even though for SLPs both interpretational alternatives are possible, the existential reading is more intuitive. On the other hand, ILPs like (4) have only a generic reading: (4c) conveys the idea that hobbits were famously known for their short stature.

(3) Generic reading possible, existential reading preferred
  a. Sophia is hungry.
  b. Linguists are annoyed.
  c. A hobbit was drunk.

(4) Generic reading only
  a. Sophia is insane.
  b. Linguists are rich.
  c. A hobbit was small.

Unfortunately, whether an existential interpretation is possible or not is an insufficient criterion for distinguishing SLPs from ILPs for at least two reasons. The availability of the existential reading hinges on the reader's world knowledge. If the reader is unfamiliar with the writings of J.R.R. Tolkien, then they might not know about the physique and personality of hobbits. They might interpret (4c) existentially as picking out one of the (few) small hobbits. Similarly, if the reader has had only bad experiences with linguists, (3b) can easily be interpreted as exclusively having a generic interpretation (be it due to lack of recognition or inadequate funding).

Furthermore, there are some contexts in which ILPs receive an existential reading (Glasbey 1997). It is not impossible to imagine a situation in which Sophia has a severe mental illness. If Sophia's insanity has an episodic property due to the mercurial nature of her mental illness, then one could utter (4a) to refer to a particularly severe outburst.

2.1.2 *There*-constructions

Milsark (1974) observed that SLPs but not ILPs are acceptable in *there*-constructions like (5) and (6), respectively. Fernald (2000) extended this diagnostic to constructions with the verbs *seem* and *appear*: they are only acceptable when the embedded predicate is stage-level (7a), but not individual-level (7b); examples adapted from Fernald (2000, p. 89).

(5) a. There were people friendly.
b. There were hobbits drunk.
c. There were doors open.

(6) a. *There were people intelligent.
b. *There were hobbits small.
c. *There were doors wooden.

(7) a. There seemed/appeared to be students in the next room.
b. *There seemed/appeared to be students intellectual.

There appear to be differences within the same predicate class in how unacceptable people judge sentences (6)/(7b) to be; see also McNally (1997, 2011). However, this test seems to be the most robust one.

2.1.3 Perceptual Reports

Another one of Carlson's diagnostics are perceptual reports: SLPs are acceptable in such sentences (8), while ILPs are not (9). In these constructions, the direct object must be able to apply to stages (of an individual's existence) and not directly to individuals. The nature of stages and individuals in Carlson's (1977) ontology is elaborated in Section 2.2. In short, the speaker in a perceptual report is relaying some sporadic experience (a stage). SLPs – *nomen est omen* – fulfill the requirement of applying to stages. ILPs apply to individuals, which precludes them from appearing in perceptual reports.

(8) a. I saw Sophia annoyed.
b. Julian saw the hobbit drunk.
c. I saw the policemen be/being heroes.
d. *I saw Aleks be hungry.

(9) a. *I saw Sophia insane.
b. *Julian saw the hobbit small.
c. *I saw the cats be/being mammals.
d. *I saw Aleks be intelligent.

Perhaps unsurprisingly, there are certain limitations to this test. As in the case of indefinites and bare plurals (4a), the speaker could easily utter (9a) if they witnessed Sophia during a psychotic break. Furthermore, perceptual reports where the predicate combines with the copula can be unacceptable irrespective of the predicate type: the SLP *hungry* in (8d) is clearly ungrammatical, despite the predicate's compatibility with stages.

2.1.4 Spatio-Temporal Modification

SLPs allow spatio-temporal modification (10), whereas ILPs (11) are unacceptable or at least strongly marked with such modifiers (Fernald 2000; Kratzer 1995). Temporal modifiers that exhibit this duality tend to be short in duration. However, this diagnostic seems to be quite unreliable. Some temporal modifiers appear to be compatible with ILPs, as in (12). Though most ILP-compatible modifiers express longer time frames, some short-time modifiers go well with ILPs, as in (12d).

(10) a. Sophia is hungry at midnight.
  b. Julian is annoyed in the car.
  c. A hobbit is drunk at the Prancing Pony.

(11) a. *Sophia is insane at midnight.
  b. *Julian is blond in Thailand.
  c. *A hobbit is small at the Prancing Pony.

(12) a. Sophia was blond in childhood and dark haired as an adult.
  b. Julian was a linguist in 2005, but a poet in 2015.
  c. Merry was small in Rivendell, but tall in the Shire.
  d. Aleks was a drummer yesterday night, although he usually plays the bass.

Maienborn (2003a) argues that locative modification is unsuitable for distinguishing between SLPs and ILPs, because the apparent differences between (10) and (11) are due to the modifiers and not the predicates themselves (see also Section 2.11 of this chapter). Maienborn (2003a,b) provides a list of diagnostics for these locative modifier types and explains the acceptability of examples like (12) within her modifier typology.

If anything is becoming clear, it is the fact that no test is definite.

2.1.5 Progressive

Lakoff (1966) observed that *be* in the progressive can have only non-stative adjectives and verbs as its complements. According to Lakoff, SLPs are non-stative, and therefore are compatible with the progressive (13), whereas ILPs are stative and ungrammatical as complements of *be* (14). As already noted in the introduction, the progressive has agentive implications.

(13) a. Sophia is friendly.
  b. Sophia is being friendly.
  c. The children are asleep.
  d. *The children are being asleep.

(14) a. Sophia is insane.
  b. *Sophia is being insane.
  c. The river is noisy.
  d. ?The river is being noisy after last night's torrential downpour.

Predictably, there are exceptions from this rule. Some SLPs and ILPs (13d)/(14d) and (2) display the opposite pattern, especially when supported by the context (see, e.g. Kratzer 1995; Rothstein 1999). I will return to these examples in the next two chapters, where the progressive and agentivity take central stage.

2.1.6 Adverbs of Quantification

Adverbs of quantification such as *seldom*, *sometimes*, and *often* are compatible with stage-level (15) but not individual-level predicates (16) (Fernald 2000). Unfortunately, as has become increasingly obvious, no test is infallible (Magri 2009). Some ILPs (16c) seem grammatical in these sentences. In these examples, Aleks is behaving in a manner typically associated with the ILP's property: childish, clever, and pedantic.

(15) a. Sophia is rarely/sometimes annoyed/friendly/optimistic.
b. Julian is frequently/often happy/tired/naked.
c. Aleks is seldom/occasionally worried/drunk/hungry.

(16) a. *Sophia is rarely/sometimes insane/tall/married.
b. *Julian is frequently/often rich/blond/human.
c. Aleks is seldom/occasionally ?a child/clever/pedantic.

2.1.7 *When*-Conditionals

When-adjuncts, as in (17), have an atemporal reading (Carlson 1977; Kratzer 1995). They are compatible with SLPs (17a), but not ILPs (17b). Kratzer (1995) argues that this sensitivity is due to the restriction *when*-adjuncts put on their arguments, namely that they require a variable over which the adjuncts can quantify (see also Section 2.5). In her framework, SLPs fulfill this requirement, while ILPs do not, unless the clause has a different variable to quantify over, e.g. an indefinite object (17c).

However, this distinction is subject to much the same criticism already noted above about the existential, temporal, and locative restrictions on ILPs in relation to Sophia's potentially episodic insanity. Furthermore, as noted by e.g. de Swart (1991) and Jäger (2001), some SLPs appear to elude grammaticality with *when*-conditionals; cf. (17d) adapted from Jäger (2001, p. 95). De Hoop and de Swart (1989, 1990) argue that examples such as (17d) are prohibited because the situations they describe typically occur only once in an individual's lifetime.

(17) a. When Sophia is friendly, she is very friendly.
b. *When Sophia is insane, she is very insane.
c. When a hobbit is drunk/small, they are very drunk/small.
d. *When(ever) Peter grows up, he inherits a fortune.

2.1.8 Depictives

SLPs can be used in depictive adjuncts as in (18), but ILPs are ungrammatical here due to an underlying difference in argument structure (examples adapted from Rapoport 1991, p. 168). However, McNally (1993) argues that this contrast is pragmatic in nature. The ILPs in (19) are perfectly acceptable when supplemented with a minimal amount of context (examples adapted from McNally 1993, p. 4). Thus, this test is also not without faults.

(18) a. Ayala sold the book used/*interesting.
b. Mixa broke the glass new/*blue.
c. Shuli ate the berries raw/*large.

(19) a. Nancy returned home an Olympic silver medalist.
b. Aleks left the army a fervent noninterventionist.

2.1.9 Lifetime Effects

ILPs and SLPs trigger different implicatures in the past tense (Husband 2012; Kratzer 1995). ILPs in (20) cause so called “lifetime effects”, unlike SLPs (21). The example in (20a) carries the implication that the actress is deceased. This is true neither for its present tense counterpart, nor for the SLPs in (21).

One exception to this rule is the adjective *famous* in (20c). Here, the actress could equally plausibly be dead or alive, because fame – once acquired – is timeless and persists after death. Moreover, lifetime effects can be modulated by the context and the implicature can be easily canceled, as illustrated in Mitch Hedberg’s famous quote (22).

(20) a. The actress was intelligent/insane/Colombian.
b. The actress is intelligent/insane/Colombian.
c. The actress was/is famous.

(21) a. The actress was thankful/drunk/asleep.
b. The actress is thankful/drunk/asleep.

(22) I used to do drugs. I still do, but I used to, too. (Mitch Hedberg)

Ultimately, the difference between ILPs and SLPs with respect to lifetime effects has repeatedly been shown to be pragmatic and context-dependent, and not grammatical (cf. Fernald 2000; Jäger 1999; Magri 2009; Mittwoch 2008; Musan 1997; Roy 2013).

2.1.10 Complement Selection

ILPs but not SLPs can be complements of a handful of verbs: *think*, *hold*, and *feel* (Bolinger 1967a,b; Fernald 2000). This is illustrated in (23), adapted from Fernald (2000), where (a) examples demonstrate the individual-level and (b) examples the stage-level predicates. However, such sentences are formulaic and mannered. Their acceptability is highly subjective.

Diagnostic	SLP	ILP
Existential reading possible	✓	✗
Compatible with *there*-constructions	✓	✗
Compatible with perceptual reports	✓	✗
Spatio-temporal modification possible	✓	✗
Acceptable in the progressive	✓	✗
Compatible with adverbs of quantification	✓	✗
Compatible with *when*-conditionals	✓	✗
Depictives	✓	✗
Past tense causes "lifetime effects"	✗	✓
Compatible with *think*, *hold*, *feel*	✗	✓

Table 2.1: Diagnostic tests for stage-level and individual-level predicates (except coordination tests) with theoretically ideal but unattainable results. ✓= predicate passes test, ✗= predicate fails test.

(23) a. I thought her (to be) insane/tall/tiresome.
b. *I thought her (to be) ready/ill/tired.

(24) a. I hold her (to be) insane/clever.
b. *I hold her (to be) ready/ill.

(25) a. I feel that she is insane/clever.
b. *I feel that she is queasy/here.

2.1.11 Coordination tests

Bolinger (1973) observed that a SLP and ILP cannot be combined in situations in which the Spanish verbs *ser* and *estar* would be used (26)/(27). By Bolinger's own admission, this is a weak diagnostic and counterexamples (28) are in abundance (examples from Bolinger 1973; Kotowski 2016).

(26) a. He's sick and afflicted.
b. He's home free.
c. Who and what are these people?

(27) a. He's wicked and cruel/*afflicted.
b. *He's home wise.
c. *What and where is the theater?

(28) a. Peter is beautiful and blond.
b. The dancefloor is wet and empty.
c. ?She's American and clever.

2.1.12 Interim Summary

The tests for ILPs and SLPs outlined above and their paradigmatic results are summarized in Table 2.1. It is important to be mindful of the limitations of these diagnostics. Many contrasts are pragmatic in nature. Moreover, the examples vary in acceptability between predicates and between judges.

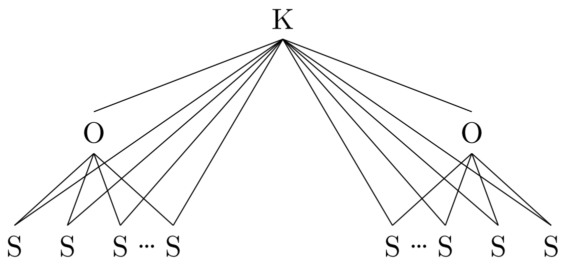


Figure 2.1: Carlson's (1977) ontology of entities. K = kind, O = object, S = stage

Based on the reviewed tests one is tempted to conclude that "[t]he ILP/SLP distinction is a conglomerate of dichotomies that overlap almost completely" (Fernald 2000, p. 142).

How can we make sense of the difference between being hungry and being intelligent if (nearly) all tests are flawed? Is there a real difference or do the predicates belong to one category, with the apparent contrasts simply being a reflection of some other factor? Much has been written on this distinction. The next section presents a number of theories dealing with such predicates. Some argue for a grammatical distinction between SLPs and ILPs, others trace it back to argument structure, while others, in turn, see it as a purely pragmatic phenomenon.

2.2 Carlson (1977)

In his discussion of bare plurals, Carlson (1977) first coined the terms stage-level and individual-level predicates, linking them to different levels in his ontology. Carlson's ontology consists of three basic entities: *kinds*, *objects*, and *stages*. The former two relate to individuals (in an abstract and concrete way) and the latter one to stages. The basic framework hierarchy is depicted in Figure 2.1.

Kinds are the top level of the ontology. This category contains bare plurals, like *humans*, *cats*, *writers*, *trees*, *vowels*, etc. Kinds are individuals (e.g. all dinosaurs or all unicorns), and not classes of things (e.g. all yellow or sharp objects). Kinds can be realized by the other two entities: objects and stages.

Objects are individuals, but are more "personal" than kinds. This category contains individuals (in the usual sense) and noun phrases, such as *Sophia*, *that black cat*, *Dr. Seuss*, *the oak*, *the Navajo language*, etc. Objects consist of stages and they can "organize" themselves into a kind, e.g. the way all unique cats constitute the kind *felines*. Unlike kinds, objects can manifest in only one place at a time. If Dr. Seuss (object) is signing books in New York, he cannot be visiting Springfield at the same time. There are, however, many cats (kind) roaming all corners of the Earth at the same time.

Stages are a more primitive category than both kinds and objects. They are not individuals but rather the spatio-temporal realizations (or manifestations) of individuals in various situations, e.g. being *friendly*, *hungry*, *avail-*

<table>
<tr><th></th><th>Non-agentive</th><th>Agentive</th></tr>
<tr><td>States</td><td>know, love, be intelligent, be asleep, be on the table</td><td>potentially: be polite, be a hero</td></tr>
<tr><td></td><td colspan="2">sit, stand, lie</td></tr>
<tr><td>Activities</td><td>make noise, roll, rain</td><td>walk, laugh, potentially: be polite, be a hero</td></tr>
</table>

Table 2.2: Semantic classification of states and activities based on Dowty (1979).

able, *in Milan*. Stages are a vignette of an individual's life. They can be the realization of both kinds and objects: *The cats in my yard at 5 am* (kind); *the moon over Venice at midnight on December* 31^{st} *2020* (object).

Stage-level properties are expressed by SLPs and individual-level properties (objects or kinds) by ILPs. Carlson defines ILPs as "characteristics" and functions from individuals to truth values (e.g. *insane*, *small*, *orange*, *male*, but also *a liar* can apply directly to *Donald Trump*). Stage-level predicates (or "happenings") are functions from stages to truth values (e.g. *hungry*, *late*, *frightened*, *awake*, but also *in Prague* cannot apply to the individual *Josef K.* but to the spatio-temporal slice of his life during his trial). A small group of kind-level predicates are functions from kinds to truth values (e.g. *widespread*, *numerous*, *rare*, *extinct*).

During composition, ILPs such as *intelligent* can immediately apply to Sophia, but this is not as straightforward for SLPs. In order to express the fact that Sophia is hungry, the stage-level predicate *hungry* needs to be able to combine with the individual *Sophia*, despite the former being compatible only with stages. To solve this incompatibility, Carlson proposes a two-place realization relation $R(stage, individual)$, which anchors the individual in space and time. By applying the realization relation, the individual becomes a stage of the individual, and thus is compatible with the SLP *hungry*; see Chapter 3 example (55) for how this relation composes computationally.

For Carlson, the conceptual difference between ILPs and SLPs lies in their basic ontological category, i.e. whether they predicate over a timeless individual or over a locally or temporally bound situation. The syntactic and semantic differences are a consequence thereof.

2.3 Dowty (1979)

Dowty (1979) divides states into three groups: (i) momentary statives, which encompass stage-level (e.g. *be on the table*, *be asleep*) and individual-level predicates (e.g. *know*, *love*, *be intelligent*), as well as habitual uses of verbs of all classes; (ii) interval statives, which comprise of stage-level predicates, as well as agentive and non-agentive uses of *sit*, *stand*, *lie*; and (iii) copula-predicate constructions such as *be polite*, *be a hero* (Dowty 1979, p. 184). The relevant fragment of Dowty's taxonomy is presented in Table 2.2.

The classification is based on an array of syntactic tests. The first two state groups can be distinguished by whether they are grammatical in the progressive or other agentive contexts (e.g. the imperative, *persuade X to do Y*, *do X deliberately*). Momentary statives are incompatible with the progressive (29a), whereas interval statives are grammatical in agentive contexts (29b), as long as the object of *lying*, *sitting*, etc. has moved (recently) or has the potential to do so (30). The last group, copula-predicate constructions, is illustrated in (29c). Dowty argues that whenever the progressive is grammatical, the adjectival predicate is being used as an SLP, and as an ILP when the progressive is ungrammatical.

(29) a. *Julian is (deliberately) being asleep/intelligent. momentary stative
b. The Tower of Pisa is leaning/leans. interval stative
c. Sophia is being friendly/a hero. copula-predicate construction

(30) a. The cat is lying/?lies on the chair.
b. Tübingen ?is lying/lies on the Neckar.

The third state group's affiliation to agentive states or activities is left open. They could be classified as momentary states if the individual's politeness and being a hero are "habitual". Alternatively, they could be activities and express a change of state from rudeness to politeness or cowardice to courage. The subtle difference lies in whether Sophia is presently evidencing some behavior (although it is not in her nature) or whether Sophia's property currently in evidence is being described (Dowty 1979, p. 115).

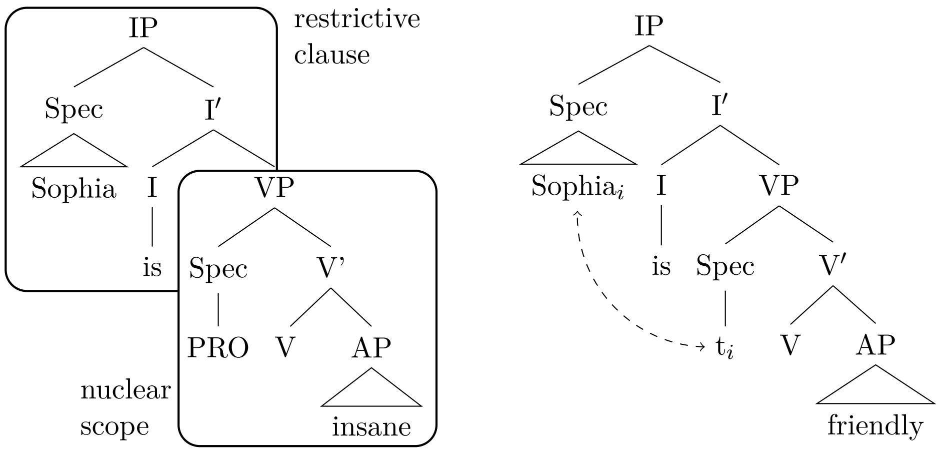
Dowty (1979) admits that some of the distinctions in his classification are "fuzzy". However, for him, the essence of the distinction between stage- and individual-level adjectival predicates is whether or not they are grammatical in agentive contexts, in particular in the progressive.

2.4 Diesing (1992)

Diesing (1992) argues that SLPs differ syntactically from ILPs. Specifically, she proposes two types of heads of inflectional phrase (*Infl*): *raising Infl* compatible with SLPs, and *control Infl* compatible with ILPs. The syntactic structures for the SLP and ILP interpretations à la Diesing are depicted in Figure 2.2.

Control Infl requires the subjects to be generated in the specifier of inflectional phrase (Spec IP) position (i.e. in the restrictive clause, RC), outside of the verbal phrase (VP). In Figure 2.2a, Sophia is generated in the Spec IP position and is settled there. Sophia's base position in Spec IP creates a vacuum within the VP: the Spec VP position is empty. Since nature abhors a vacuum, the empty position is filled by a PRO, which prevents the subjects of ILPs from being lowered to the nuclear scope (NS).

Raising Infl requires the subjects to be generated within the VP (in the nuclear scope). Diesing proposes that all VP-internal subjects are raised to the specifier of IP position (in the restrictive clause). Therefore, subjects of SLPs are raised into the Spec IP position, leaving a trace t_i within the VP. In Figure 2.2b, Sophia is generated much lower, within the nuclear scope, but



(a) Individual-level, control Infl. The subject is base-generated in Spec IP and the corresponding logical form is roughly: GEN[INSANE(SOPHIA)].

(b) Stage-level, raising Infl. The subject is base-generated in Spec VP and the corresponding logical form is roughly: ∃[FRIENDLY(SOPHIA)].

Figure 2.2: Surface structure for the individual- and stage-level predicate readings based on Diesing (1992).

moves up along the dotted line to occupy the Spec IP position, just as she inherently does in Figure 2.2a. This movement can be undone by lowering the subject to the Spec VP position (by following the trace). This distinction is summed up in the *Mapping Hypothesis.*

Mapping Hypothesis *Material from VP is mapped into the nuclear scope. Material from IP is mapped into a restrictive clause.*

Whether the subject moves or not has consequences for the control structure it comes under. The existential interpretation (e.g. (3a) *Sophia is hungry* or Figure 2.2b) is subject to existential closure ∃, but the generic interpretation is not (e.g. (4a) and Figure 2.2a *Sophia is insane*).[1] Instead, it is bound by a generic null operator GEN.

In sum, Diesing (1992) argues for a syntactic explanation of the ILP/SLP dichotomy. She pinpoints the source of the distinction in the position into which the predicates' subjects are mapped (Spec IP for ILPs and either Spec IP or Spec VP for SLPs), and consequently by what operator they are governed.

2.5 Kratzer (1995)

Kratzer (1995) follows Diesing in assuming that SLPs and ILPs are syntactically distinct, but argues that this is due to their underlying differences in argument structure. Specifically, these predicates differ in their ability to be

[1]Existential closure is an operation that inserts an existential quantifier which binds all free variables in its scope (Heim 1982), thereby allowing for the evaluation of the sentence's truth value. Diesing assumes this happens at the nuclear scope level.

located in time and space. Carlson's contrast of stative and non-stative is insufficient. Not all ILPs are stative and some SLPs can be stative, especially in appropriate contexts. Aleks was born with brown eyes (ILP), but if he puts in contact lenses, he might have purple eyes. Similarly, Jane might be acutely sick (SLP) with the Coronavirus and will hopefully not suffer from any chronic condition, such as having asthma (ILP), as a result. Kratzer admits though, that the distinction between SLPs and ILPs is context-dependent and vague (Kratzer 1995, p. 136).

Kratzer's proposal rests on the idea that SLPs are anchored in space and time, unlike ILPs. This localization is achieved through a thematic role argument in the logical form, as in (31)–(32). SLPs are Davidsonian in nature (Davidson 1967): they have a special argument position for events or spatio-temporal locations (the eventuality argument; see also Chapter 4).

Examples (31)–(32) illustrate the difference in argument structure between SLPs and ILPs. The external arguments are marked in cursive, and all other arguments are internal. The spatio-temporal argument is highest in the argument hierarchy. Thus, if it is present, it will always be the external argument, which is not without consequence for the syntax.

In the semantic representation, SLPs carry a variable l ranging over times and places. Being "located in space" enables SLPs to combine with locative modifiers (33). ILPs (34) lack this argument, and therefore are incompatible with such modifiers (barring an interpretation in which Sophia is bipolar and her moods are extremely volatile).

(31) Stage-level predicates
 a. hit ⟨*location*, agent, theme⟩
 b. hungry ⟨*location*, theme⟩

(32) Individual-level predicates
 a. belong ⟨theme, goal⟩
 b. insane ⟨theme⟩

(33) $[\![\text{hungry}]\!] \equiv \lambda x \lambda l[\textsc{hungry}(x, l)]$
 a. Sophia was hungry at the gym.
 b. Sophia was hungry at noon.

(34) $[\![\text{insane}]\!] \equiv \lambda x[\textsc{insane}(x)]$
 a. *Sophia was insane at the gym.
 b. *Sophia was insane at noon.

The dissimilarity in argument structure translates to the syntactic differences between the predicates. The absence of the eventuality argument allows the subjects of ILPs to be base-generated outside of the maximal projection of their predicates (i.e. in Spec IP). Subjects of SLPs are always base-generated within the maximal projection of their predicates (i.e. in Spec VP) due to the presence of a Davidsonian argument (e.g. that a locative could relate to).

Kratzer's proposal can be summarized in the following two points. Stage- and individual-level predicates differ in their argument structure. SLPs have an additional Davidsonian argument ranging over space-time locations, which ILPs lack. The syntactic differences proposed by Diesing (1992) are a consequence thereof.

2.6 Chierchia (1995)

Chierchia's (1995) proposal is similar to Kratzer's (1995) approach in that he localizes the differences between stage- and individual-level predicates in argument structure. Chierchia argues, along with Parsons (1990), that all predicates have a Davidsonian argument (Davidson 1967) ranging over eventualities (or occasions). Crucially, in ILPs this argument is bound by a generic operator, making them inherently generic: the property expressed by the ILP can be said to be generally true of the individual to which it applies.

In their lexical entries, ILPs have a habitual operator *Hab*, which carries a feature [+Q] that SLPs lack. This [+Q] feature induces the presence of the generic operator *Gen* in its local environment. In other words, ILPs must be licensed by *Gen* under a strict form of locality. Chierchia (1995) compares ILPs to negative polarity items. This is akin to the fact that *any* in *Aleks doesn't have *some/any potatoes* is grammatical due to the sentence's downward entailing environment but is ungrammatical in an upward entailing environment *Aleks does have some/*any potatoes.*

Examples (35)–(36) illustrate this point. The lexical entry for *intelligent* in (35) contains a Davidsonian variable *s*, roughly the generalization over situations in which Julian appears. The generic operator *Gen* restricts the ILP, forcing them to have some (arbitrary) location. The resulting interpretation is one where Julian inherently has the state of being intelligent.

In contrast, the derivation of the SLP (36) is straightforward. SLPs may be bound under the *Gen* operator in their habitual reading, or simply the predicate is applied directly to the individual.

The copula plays a very minor role in the derivation of (35) and (36). According to Chierchia (1995), the copula is a raising verb (like *seem* and *appear*; cf. Stowell 1978) and, aside for allowing complement selection, does not contribute to the sentence meaning. However, he leaves open the possibility of other copular analyses.

(35) Julian is intelligent.

a. $[\![\text{Julian}]\!] \equiv \textsc{julian}$

b. $[\![\text{intelligent}]\!] \equiv \lambda x \text{ Gen s}[\textsc{in}(x,s)][\textsc{intelligent}(x,s)]$

c. $[\![\text{Julian is intelligent}]\!]$
$\equiv \lambda x \text{ Gen } s[\textsc{in}(x,s)][\textsc{intelligent}(x,s)](\textsc{julian})$
$\equiv \text{Gen } s[\textsc{in}(\textsc{julian},s)]\ [\textsc{intelligent}(\textsc{julian},s)]$

(36) Julian is tired.

a. $[\![\text{tired}]\!] \equiv \lambda x \lambda s[\textsc{tired}(x,s)]$

b. $[\![\text{Julian is tired}]\!] \equiv \lambda x \lambda s[\textsc{tired}(x,s)](\textsc{julian})$
$\equiv \lambda s[\textsc{tired}(\textsc{julian},s)]$
$\equiv \exists s[\textsc{tired}(\textsc{julian},s)]$ existential closure

In sum, Chierchia (1995) roots the difference between ILPs and SLPs in the lexicon. Unlike Kratzer (1995), he identifies the ILP's genericity under the Gen operator as the source of the distinction.

2.7 De Hoop and de Swart (1990)

De Hoop and de Swart (1989, 1990) reject the idea that ILPs and SLPs differ in argument structure, but – in line with Chierchia (1995) – assume that all predicates introduce a Davidsonian eventuality argument. De Hoop and de Swart divide the predicates into two groups: stage-level predicates on one side vs. individual level and 'once-only' predicates (e.g. *die*, *grow up*) on the other. The contrast between SLPs and ILPs/'once-only' predicates is illustrated in (37).

(37) a. Sophia is rarely friendly/annoyed/*tall/*married.
b. When Peter kills a relative/*grows up, he inherits a fortune.

The contrast between the two groups, as well as the ungrammaticality of individual-level and 'once-only' predicates in sentences such as (37), stems from the *uniqueness presupposition* and the *plurality condition on quantification* (de Swart 1991, p. 59 and p. 118, respectively).

Uniqueness presupposition on the Davidsonian argument *The set of spatio-temporal locations that is associated with an individual-level or 'once-only' predicate is a singleton set for all models and each assignment of individuals to the arguments of the predicate*

Plurality condition on quantification *[An adverb of quantification] does not quantify over a set of situations if it is known that this set has cardinality less than two. A set of situations is known to be a singleton set if:*

1. *the predicate contained in the sentence satisfies the uniqueness presupposition on the Davidsonian argument, and*

2. *there is no (in)definite NP present in the sentence which allows indirect binding by means of quantification over assignments*

The uniqueness presupposition requires the individual level and 'once-only' predicate to (generally) apply to an individual only once, because "[t]he situation the proposition describes has a unique location in the life of an individual" (de Swart 1991, p. 59). Since it is a pragmatic restriction, exceptions are possible under the appropriate circumstances. In contrast, SLPs typically describe recurrent situations.

de Hoop and de Swart (1989, 1990) consider the uniqueness presupposition and the plurality condition on quantification as crucial in establishing the grammaticality of a sentence. They are sufficient for distinguishing between an individual's episodic and permanent characteristics.

2.8 Fernald (2000)

Fernald (1999, 2000) regards the differences between SLPs and ILPs listed in Section 2.1 as a mixture of various effects and systematically explains these contrasts. Fernald (1999) adopts Kratzer's approach by assigning a temporal argument to SLPs. He argues that SLPs describe spatio-temporal slices of the world, whereas ILPs are independent of space and time. Unlike Kratzer (1995), Fernald assumes that both stage- and individual-level predicates have a Davidsonian argument. Furthermore, SLPs have an additional eventuality argument for spatio-temporal locations that ILPs lack.

Accordingly, Fernald proposes that the distinction between the predicates is lexical. Nevertheless, context and other pragmatic factors have a strong influence on the interpretation, and sentences with ILPs are prone to various forms of reinterpretation (McNally 1993; Mittwoch 2008; Musan 1997; see also Chapter 4 Section 4.3). For example, Fernald (2000) considers Sophia's agentive being friendly as an instance of *evidential coercion*, by which the ILP is reinterpreted as being under Sophia's control. He explains the acceptability of some ILPs in combination with adverbs of quantification as *interruption*, because the adverbs interrupt the interval during which the ILP holds, thereby allowing a plurality of situations where the ILP is true.

Overall, Fernald (1999, 2000) considers the differences between SLPs and ILPs to be the product of several contrasts, some of which are lexical, while others are pragmatic.

2.9 Husband (2012)

In keeping with Kratzer (1996), Husband (2012) assumes that the SLP/ILP distinction is made at the phrase level through the combination of the verb and its internal argument. However, he rejects the idea that SLPs and ILPs are lexically different, focusing instead on the composition of the predicate and its arguments. At the heart of his theory is the notion of *quantization* (Krifka 1989).

Quantization relates to the sum of X's parts. If entities such as *book*, *cat*, and *watch* are deconstructed, then it is easy to notice that their parts are heterogeneous. A page, a tail, and a screw cannot be described as a book, a cat, or a watch, respectively. On the other hand, entities such as *wine*, *snow*, and *gold* are cumulative, because their parts are homogeneous and can be used to describe the undivided entity.[2]

According to Husband (2012), ILPs are homogeneous predicates that apply to the individual itself, which makes them temporally stable. SLPs are quantized predicates that apply to quantized stages of the individual (Husband 2012, p. 104), making them restricted to certain times and locations.

Quantization manifests itself in the scale structure of adjectives. Quantized predicates (SLPs) are closed scale adjectives, and homogeneous predi-

[2]Krifka (1989) applies this distinction to verb classes (Vendler 1957). Telic verbs like *solve the puzzle* or *reach the summit* have a terminal point and are quantized events. Atelic verbs like *walk* or *run* do not have a terminal point and are cumulative.

cates (ILPs) are open scale adjectives. Closed scale adjectives map the property to a maximum or minimum on a scale, and are therefore compatible with proportional modifiers (38a). Open scale adjectives are inherently vague, and are therefore incompatible proportional modifiers (38b). However, both *intelligent* and *insane* seem acceptable to me with at least some of the modifiers.

(38) a. slightly/half/mostly/perfectly/100% drunk/friendly/full
b. *slightly/*half/*mostly/*perfectly/*100% tall/intelligent/insane

To sum up, Husband (2012) argues that the derivation of an SLP and ILP is contingent on the predicate's scale structure. It is governed by compositional rules that map a given property to the individual or to the quantized stages of the individual.

2.10 Jäger (1999)

Jäger (1999, 2001, 2003), much like Fernald (1999, 2000), suggests that the distinctions between SLPs and ILPs listed in Section 2.1 do not have one underlying cause, but that they stem from several independent contrasts: (i) restrictions on modification; (ii) subject effects (i.e. the availability of a generic and an existential reading); and (iii) perception reports.

The restrictions on modification subsume the distinction between permanent and temporary properties, the lifetime effect, and the acceptability of temporal modification. Jäger traces the first distinction to world knowledge and the latter two to pragmatic effects based on the limitations of the respective tests. Perception reports do not feature majorly in his work, but Jäger (2003) leaves open the possibility that the copula might play a role in explaining the contrast between SLPs and ILPs observed there. Subject effects result from the clause's topic structure and the aspectual distinction between statives vs. non-statives.

Focusing on subject effects, Jäger explains the ILP/SLP dichotomy in terms of differences in information structure. He derives the observed effects in a dynamic semantics, in which the meaning of a sentence is identified with its context change potential (Jäger 2001, p. 115), i.e. how the sentence's contribution reshapes the existing context (see e.g. Blutner 2000; Groenendijk and Stokhof 1991; Kamp 2002). According to Jäger (2001), topicality is the deciding factor in the SLP/ILP opposition and he proposes the *Discourse Linking Principle.*

Discourse Linking Principle *Every atomic clause has a topic.*

To illustrate the difference between topic and focus, consider the examples in (39). The topic is what the sentence is about, whereas the focus (or comment) is what is being said about the topic.

(39) a. [This]$_{topic}$ [is a hobbit.]$_{focus}$ [She]$_{topic/focus}$ is stout.
b. [The [old]$_{focus}$ hobbit]$_{topic}$ is gluttonous/sick.
c. [Hobbits]$_{topic/focus}$ are gluttonous/sick.

The topic of a sentence can be a strong nominal, for example *Sophia*, *the hobbit* in (39b), *all cats*, a discourse-linked anaphoric and indefinite expressions as in (39a), etc. Weak nominals (e.g. the bare plural *women*, *a hobbit*, *nine cats*, unbound anaphoric and indefinite expression, etc.) cannot be topics. Bare plurals like *hobbits* in (39c) are notable in that they can have an existential or generic reading depending on the post-copular predicate.

Jäger (1999) further assumes that events are localized, but states are not. Non-stative predicates always allow weak subjects, because they are localized, "[t]hus localization may provide a discourse link for eventive, but not for stative clauses" (Jäger 1999, p. 91). Stative predicates allow weak subjects only if there is another explicit or implicit non-subject argument that can take over the topic role.

ILPs are stative and must have strong subjects (Carlson 1977; Fernald 2000; Ladusaw 1994; Milsark 1974), because the subjects of ILPs must be construed as topics. SLPs are non-stative and allow weak subjects. The subjects of SLPs can be topics, but SLPs, like other non-stative predicates, have a second option: the eventuality's location can be a default topic.

If the predicate's subject is strong, it is construed as the topic and the generic interpretation of an ILP or SLP is available. The existential interpretation is limited to SLPs precisely because the subjects of SLPs can show weakness. If the predicate's subject is weak, the SLP can use the eventuality's location as a topic, and thereby arrive at a grammatical existential interpretation. ILPs with weak subjects violate the Discourse Linking Principle and are ungrammatical.[3]

Jäger's (1999) proposal raises the important point that the differences between SLPs and ILPs may stem from multiple heterogeneous factors and not one underlying conceptual difference. Some differences can be explained with world knowledge, other with pragmatic effects, and others still with information structure, although some remain puzzling.

2.11 Maienborn (2003)

In contrast to these (predominantly) syntactic and semantic approaches, Maienborn (2001, 2003a,b, 2004, 2005) proposes a pragmatic account of the SLP/ILP opposition. Maienborn's proposal builds on Blutner's (2000) bidirectional optimality theoretic version of the Gricean maxims (Grice 1975; Horn 1984; Levinson 2000).

Unlike the semantic approaches discussed above, Maienborn rejects the claim that SLPs (and ILPs) introduce a Davidsonian event argument. Instead, she shows that both types of predicates are more akin to statives than event verbs. The apparent differences between SLPs and ILPs can be reduced

[3]Adjectives like *present*, *available*, *visible* are a special case, because they have an implicit argument (present where; available/visible for whom). "I assume that such implicit arguments are anaphoric per default. They are construed as topics already in the lexicon. Of course, these topical implicit arguments can be bound by a null generic operator" (Jäger 2001, p. 121).

to two underlying mechanisms: the *temporariness effect* and the *agentivity effect*.

The temporariness effect relates to the behavior of SLPs and ILPs with relation to locative modifiers (see also Section 2.1.4 of this chapter). SLPs are typically compatible with locative modifiers (40a), whereas ILPs are typically incompatible (40b). Maienborn proposes that there are three kinds of local modifiers masquerading as one: frame setting, event-external, and event-internal, as illustrated in (41), adapted from Maienborn (2003a, p. 7). Frame setting modifiers localize the evaluation situation, situation internal modifiers localize a part or a participant of the described situation, and situation external modifiers localize the described situation as a whole. Frame setting modifiers, unlike the other two, are base-generated outside of the VP.

The external and internal modifiers are event-related. The marking event in (41) is taking place at the marketplace (external) and the physical marking part of the event is being done on the sheep's ears (internal). The frame setting modifier *in the Andes* is not event-related but "sets a frame for the proposition expressed by the rest of the sentence" (Maienborn 2001, p. 191).

(40) a. Sophia is hungry in the pub at midnight.
b. *Sophia is insane in the pub at midnight.

(41) [In the Andes]$_{\textit{frame setting}}$ the sheep are marked
[on the ears]$_{\textit{event-internal}}$ [at the marketplace.]$_{\textit{event-external}}$

Frame setting modifiers are semantically underspecified and can be interpreted in several ways. The frame setting modifier *in Italy* in example (42) from Maienborn (2003a) can be interpreted in at least three ways (42a)–(42c). One such interpretation restricts the sentence's topic time, which gives rise to the temporal reading (42a). In the temporal reading, the speaker makes a claim about a particular period of Maradona's life.

(42) Maradona was married [in Italy.]$_{\textit{frame setting}}$
a. When he was in Italy, Maradona was married. *temporal reading*
b. According to Italian law, Maradona was married.
c. According to the belief of the people in Italy, Maradona was married. *epistemic reading*

Crucially, the perceived oddness of ILPs with locative modifiers is not due to ungrammaticality but due to the (pragmatic) unacceptability of the frame modifier's temporal reading. Maienborn refers to this preference for interpreting the predicate as temporarily bound as the aforementioned temporariness effect. The temporariness effect of (42) is the product of pragmatic economy principles and world knowledge (for a detailed account of the derivation of a temporal reading, see Maienborn 2003b, Chapter 6).

The agentivity effect arises from the optimal reinterpretation of a semantically specified but ungrammatical sentence. Maienborn (2005) posits that neither SLPs nor ILPs have an eventuality argument, therefore they cannot combine with manner adverbials (43), which modify an eventuality (examples from Maienborn 2005, p. 294–296).

However, examples (44a)–(44b) appear to contradict this generalization. Maienborn (2005) maintains that the adverbial's eventuality requirement remains unsatisfied in (44a)–(44b) due to the predicate's lack of an eventuality argument. The resulting sortal conflict can be resolved by reinterpretation, leading to a repair of the defective phrase. Reinterpretation is a pragmatic effect, meaning that it relies on the craftiness of the hearer in constructing a grammatical interpretation. In some cases, the reconstruction is felicitous, in others it may not be.

(43) a. *The hobbit was restlessly hungry.
b. *The table was sturdily wooden.

(44) a. Carol war schnell / *langsam in der Stadt.
Carol was quickly slowly in the town
'Carol was quickly/*slowly in town.'
b. Das Fenster / *Die Höhle war weit offen.
the window the cave was widely open
'The window/*the cave was wide(ly) open.'

How does this relate to Sophia being friendly but insane? The relationship between the copula and stage- and individual-level predicates will be elaborated on in the next two chapters, especially in relation to the progressive (see also Section 2.1.5 of this chapter). In a nutshell, Maienborn (2003a) suggests that the copula is stative. The combination with an SLP and ILP will result in a stative phrase. Should an active interpretation of the phrase be required, the listener may reinterpret the copula-predicative construction agentively (e.g. *being friendly*) or may give up on making sense of it entirely (e.g. **being intelligent*) if they see no (contextual) justification for a repair.

To sum up, Maienborn (2003a,b, 2004, 2005) proposes a pragmatic solution to the stage-level/individual-level puzzle. The seemingly erratic behavior of these predicates can be explained by the temporariness effect and the agentivity effect.

2.12 Chapter Summary

The aim of this chapter was twofold. In part, it was meant to summarize various effects associated with stage- and individual-level predicates. However, the criteria used to distinguish the two are murky and counterevidence is plentiful. The second goal was to outline several theories that try to capture the subtle distinction between stage-level predicates and individual-level predicates. These theories root the distinction between the predicates on a spectrum from ontological differences (Carlson 1977; Dowty 1979), through syntactic and lexical differences (Chierchia 1995; Diesing 1992; Fernald 2000; Husband 2012; Kratzer 1995), to pragmatic effects and beyond (de Hoop and de Swart 1990; Jäger 1999; Maienborn 2004). It is unclear if stage-level predicates and individual-level predicates are at their core in opposition or if the distinction is "a conglomerate of overlapping contrasts."

All in all, whether Sophia is friendly or merely being friendly here and now cannot be determined solely on the basis of the predicate. If friendliness is insufficient, then could being be the answer?

3
The Verb

Having examined the predicate, it is time to move on to the verb – the copula, i.e. the *being* of Sophia's friendliness. The predicate offers some insight into how adjectives such as (1) *friendly* and *intelligent* differ, but in many cases leaves the final word to *be* itself. If the predicate alone cannot explain agentivity, perhaps the verb is the root of the distinction?

(1) a. Sophia is friendly/noisy/intelligent/retired.
    b. Sophia is being friendly/noisy/*intelligent/*retired.

There are two groups of theories that solve Sophia's "passive" and "active" friendliness in different ways. The first group hypothesizes the existence of a number of homonymous copulas that differ in their syntactic and semantic properties. The second group argues in favor of a singular copula that is able to accommodate both friendliness variants. This chapter presents several theories of either kind, before setting on two theories, which are explored further and contrasted in later chapters.

3.1 Be(e) Hive

The compatibility or incompatibility of some predicates with *being* may be due to the fact that there are two or more homophonous verbs *to be*. These *be* verbs have different semantic, syntactic, and morphological properties, for example with respect to agentivity (1), negation (45a) vs. (45b), and inchoative interpretations (46a) vs. (46b) (adapted from Becker 2004b). Some languages like Spanish, Portuguese, and Hebrew have two different verbs which are overt realizations of the different uses of the copula (Arche et al. 2017; Greenberg 2008; Maienborn 2003b). Proponents of the multiple *be* (or *bee* hive) hypotheses theorize that this is the case for English as well.

(45) Position wrt negation

a. Sophia is (not) friendly. — precedes negation

b. Sophia will (not) be friendly. — follows negation

(46) (Non-)inchoative meaning

a. Why don't you be more sociable? — inchoative

b. Why aren't you more sociable? — non-inchoative

In fact, this has been the classical way of thinking about the different uses of *be* (Frege 2001; Montague 1974; Partee 1977). Many researchers have picked up the idea that there is more than one *be*: among others, the previously discussed approaches of Bolinger (1967b), Carlson (1977), Diesing (1992), Fernald (2000), and Kratzer (1995). The multiple-*be* theories uniformly put the brunt of the difference between *is friendly* and *is being friendly* on the predicate. The appropriate copula must be compatible with the predicate. Therefore, grammaticality alternations such as in (1) reflect the wrong choice of verb for the predicate type.

3.1.1 Frege (1892), Montague (1974), Partee (1977)

Frege (2001) considered the copula semantically vacuous, calling it *die bloße Form der Aussage ohne Inhalt*, "the mere form of the statement without content." He argued that the actual information content is provided by the predicate. In example (47a), removing *blue* renders the utterance without content. It would merely express the existence of the sky. At the same time, the copula can be used as a symbol for identity (47b), to specify who someone is (47c), or point someone out in the crowd (47d). Whether (47) illustrates the full spectrum of the copula's uses (Higgins 1973), or whether these can be reduced, e.g. to only (47a) and (47b), is a matter of debate (den Dikken 2006; Dölling 1998; Heycock 2012; Mikkelsen 2005; Rapoport 1987). One thing is clear: the copula has many areas of application and can fulfill diverse roles.

(47) Types of copular clauses

a. The heaven is blue. — predicational

b. The morning star is the evening star. — equative

c. The winner is Aleks. — specificational

d. That$_{deictic}$ (woman over there) is Sophia. — identificational

Montague (1974) viewed the copula as expressing a relation between the subject and the predicate. He identified two *be*s: a transitive verb be_1 as in (48a)/(50), and be_2 (48b)/(51) inserted by the rule for combining predicate adjectives with their subjects. One question that Montague leaves open is how these stative *be*s are to explain the alternations in (1) and (49).

(48) a. Julian is a man/tall.

b. Julian is available/awake.

(49) a. Julian is nice/tired/a child.
b. Julian is being nice/*tired/?a child.

To close this gap and to account for the alternations in (49), Partee (1977) introduces a third new *be*. This be_3 (52) is an active verb. The differences between *be*s within Partee's framework are illustrated in (50)–(52) below. Consider the following three copulas and their computation: be_1 of identity (50), predicational be_2 (51), and active be_3 (52).

(50) Sophia is Juliette.
a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}$
b. $[\![\text{be}_1]\!] \equiv \lambda x \lambda y[x = y]$
c. $[\![\text{Juliette}]\!] \equiv \textsc{juliette}$
d. $[\![\text{be}_1 \text{ Juliette}]\!] \equiv \lambda x \lambda y[x = y](\textsc{juliette})$
$\equiv \lambda y[\textsc{juliette} = y]$
e. $[\![\text{Sophia is Juliette}]\!] \equiv \lambda y[\textsc{juliette} = y](\textsc{sophia})$
$\equiv \textsc{sophia} = \textsc{juliette}$

(51) Sophia is friendly.
a. $[\![\text{be}_2]\!] \equiv \lambda P[P]$
b. $[\![\text{friendly}]\!] \equiv \lambda x[\textsc{friendly}(x)]$
c. $[\![\text{be}_2 \text{ friendly}]\!] \equiv \lambda P[P](\lambda x[\textsc{friendly}(x)]) \equiv \lambda x[\textsc{friendly}(x)]$
d. $[\![\text{Sophia is friendly}]\!] \equiv \lambda x[\textsc{friendly}(x)](\textsc{sophia})$
$\equiv \textsc{friendly}(\textsc{sophia})$

(52) Sophia is being friendly.
a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}_{+animate}$
b. $[\![\text{be}_3]\!] \equiv \lambda P[P_{+active}]$
c. $[\![\text{be}_3 \text{ friendly}]\!] \equiv \lambda P[P_{+active}](\textsc{friendly})$
$\equiv \lambda x[\textsc{friendly}_{+active}(x)]$
d. $[\![\text{Sophia is being friendly}]\!]$
$\equiv \lambda x[\textsc{friendly}_{+active}(x)](\textsc{sophia}_{+animate})$
$\equiv \textsc{friendly}_{+active}(\textsc{sophia}_{+animate})$

According to Partee (1977), whether the active be_3 in combination with an adjective produces an acceptable sentence relates to agentivity or volition, see (53). This effect appears to hinge on the type of adjectival predicate (e.g. *friendly* but not *insane*) and runs along the blurry lines of the stage-level (SLP) and individual-level predicate (ILP) distinction from Chapter 2.

(53) a. Sophia is (being) friendly/(*)insane.
b. The children are asleep/*are being asleep.
c. The river is noisy/?is being noisy (due to the freshet).

Partee (1977) postulates that be_3 has an +*active* marker in regard to the active/stative feature (Lakoff 1966). This allows it to combine with adjectives which permit animate subjects. A VP resulting from the combination of such an adjective with be_3 then requires animate subjects. Therefore, the meaning of be_3 is similar to that of *act* in that there is an element of agentivity or control.

Crucially, Sophia's friendliness can be passive or active because the adjective fits the selectional restrictions of the stative be_2 and active be_3. In contrast, the adjective *tired* combines readily with the stative be_2, but it is incompatible with the active be_3, ruling out a sentence such as **Julian is being tired* as ungrammatical. Partee's active *be* in addition to Montague's stative *be*s are the foundation on which most other *be(e)*-hive theories are based.

3.1.2 Carlson (1977)

To reconcile the combinatory restrictions he imposes on the predicates (cf. Chapter 2 Section 2.2), Carlson (1977) postulates the existence of three *be*s: be_1 that maps sets of stages to sets of individuals, a semantically null be_2, and be_3 modeled on Partee's active *be*. Examples (54)–(56) illustrate the difference between the copulas.

Hungry in (54) is a stage-level predicate and cannot be directly applied to the individual Sophia due to ontological constraints. The copula be_1 combines with an SLP P to yield a predicate which is compatible with an individual. This is possible, because the copula contains the realization relation $R(y^s, x^i)$ that applies stages y^s to individuals x^i. The realization relation anchors Sophia in space and time. Thus, (54) reads in prose as "there exists a stage at which Sophia is hungry."

By contrast, the semantically vacuous be_2 does not contribute to the meaning of (55). *Insane* is an individual-level predicate, and accordingly it can be applied directly to the individual Sophia through what is in essence the identity function. This *be* is identical to Partee's (1977) be_2 in (51).

(54) Sophia is hungry.

a. $[\![\text{Sophia}]\!] \equiv \lambda P[P(\textsc{sophia})]$

b. $[\![\text{be}_1]\!] \equiv \lambda P \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ P(y^s)]$

c. $[\![\text{hungry}]\!] \equiv \textsc{hungry}$

d. $[\![\text{be}_1 \text{ hungry}]\!] \equiv \lambda P \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ P(y^s)](\textsc{hungry})$
$\equiv \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{hungry}(y^s)]$

e. $[\![\text{Sophia is hungry}]\!]$
$\equiv \lambda P[P(\textsc{sophia})](\lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{hungry}(y^s)])$
$\equiv \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{hungry}(y^s)](\textsc{sophia})$
$\equiv \exists y^s[R(y^s, \textsc{sophia})\ \&\ \textsc{hungry}(y^s)]$

(55) Sophia is insane.

a. $[\![\text{be}_2]\!] \equiv \lambda P[P]$ = Partee's be_2 (51)

b. $[\![\text{insane}]\!] \equiv \textsc{insane}$

c. $[\![\text{be}_2 \text{ insane}]\!] \equiv \lambda P[P](\textsc{insane}) \equiv \textsc{insane}$

d. $[\![\text{Sophia is insane}]\!] \equiv \lambda P[P(\textsc{sophia})](\textsc{insane})$
$\equiv \textsc{insane}(\textsc{sophia})$

(56) Sophia is being friendly.

a. $[\![\text{be}_3]\!] \equiv \lambda P \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{act}(P)(y^s)]$

b. $[\![\text{friendly}]\!] \equiv \textsc{friendly}$

c. $[\![\text{be}_3 \text{ friendly}]\!]$
$\equiv \lambda P \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{act}(P)(y^s)](\textsc{friendly})$
$\equiv \lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{act}(\textsc{friendly})(y^s)]$

d. $[\![\text{Sophia is being friendly}]\!]$
$\equiv \lambda P[P(\textsc{sophia})](\lambda x^i\ \exists y^s[R(y^s, x^i)\ \&\ \textsc{act}(\textsc{friendly})(y^s)])$
$\equiv \exists y^s[R(y^s, \textsc{sophia})\ \&\ \textsc{act}(\textsc{friendly})(y^s)]$ computes as in (54e)

The final *be*$_3$ is much different from its stative brethren. It is compatible with an activity or action and requires an animate subject. This *be* roughly means "is acting like" (Carlson 1977, p. 121) and is used in the progressive to express an action or behavior. Therefore, (56) translates to *Sophia was acting/behaving friendly. Be*$_3$ is also the copula present in a handful of other constructions, e.g. *Sophia can be friendly* and the imperative *Be friendly!* This active copula is what allows the shift from an ILP to an SLP, because it enforces an active existential reading on its predicate. Whether or not the agentive interpretation if available depends on whether the predicate is compatible with this copula.

Example (57) spells out the contrast between the generic (individual-level) reading, the existential (stage-level) reading, and the active reading of *Sophia is friendly.*

Carlson considers the equative use of the copula as a separate issue. He defines it as a relation $\textsc{is}(x, y)$ in (58) (Carlson 1977; Krifka et al. 1995). The $\textsc{is}$ relation makes use of yet another realization function $R(x, y)$ for relating kinds and objects to one another. In other words, (58b) expresses that if x and y are individuals (objects or kinds), then $\textsc{is}(x, y)$ holds if and only if they are identical. Sophia is Juliette if they are the same individual.

(57) Sophia is (being) friendly.

a. $\exists y^s[R(y^s, \textsc{sophia})\ \&\ \textsc{friendly}(y^s)]$ existential reading, *be*$_1$

b. $\textsc{friendly}(\textsc{sophia})$ generic reading, *be*$_2$

c. $\exists y^s[R(y^s, \textsc{sophia})\ \&\ \textsc{act}(\textsc{friendly})(y^s)]]$ active *be*, *be*$_3$

(58) Sophia is Juliette.

a. $[\![\text{Juliette}]\!] \equiv \lambda P[P(\textsc{juliette})]$

b. $\textsc{is}(x, y) \equiv [x = y \wedge R(x, y)]$

c. $[\![\text{is Juliette}]\!] \equiv \lambda P[P(\textsc{juliette})](\lambda x \lambda y[\textsc{is}(x, y)])$
$\equiv \lambda x \lambda y[\textsc{is}(x, y)](\textsc{juliette})$
$\equiv \lambda y[\textsc{is}(\textsc{juliette}, y)]$

d. $[\![\text{Sophia is Juliette}]\!] \equiv \lambda P[P(\textsc{sophia})(\lambda y[\textsc{is}(\textsc{juliette}, y)])$
$\equiv \textsc{is}(\textsc{juliette}, \textsc{sophia})$
$\equiv [\textsc{juliette} = \textsc{sophia}\ \wedge\ R(\textsc{juliette}, \textsc{sophia})]$

In sum, Carlson narrows the stative and eventive nature of friendliness and insanity down to the predicate's compatibility with the respective copulas

be_1 – be_3. He offers a more formally worked out lexical entry for Partee's active *be*. The copula's selectional restrictions determine whether an active interpretation is possible.

3.1.3 Dowty (1979)

In keeping with the previous theories, Dowty assumes the existence of multiple copulas (59): *be_1* of identity, a semantically empty *be_2* of predication, and an agentive *be_3* (Dowty 1979, p. 364).

(59) a. $[\![\text{be}_1]\!] \equiv \lambda x \lambda y[x = y]$ = (50), e.g. *Sophia is Juliette.*
b. $[\![\text{be}_2]\!] \equiv \lambda P[P]$ = (51) and (55), e.g. *Sophia is friendly.*
c. $[\![\text{be}_3]\!] \equiv act'$ cf. (52) and (56), e.g. *Sophia is being friendly.*
or $\equiv \lambda P \lambda x.(\textsc{do}(P))(x)$ cf. (61), active DO

To explain Dowty's approach, we must first briefly turn to his aspectual calculus. Dowty, following Lakoff (1966) and Vendler (1957), classified verbs into four classes: states, activities, achievements, and accomplishments, presented in (60)–(63) along with concrete examples (see also Chapter 4). States (60) are the simplest aspectual class, being purely an identity relation. All other aspectual classes build upon this aspect.

(60) States, e.g. *love*, *know*, *own*
a. $\lambda P \lambda x.P(x)$
b. $[\![\text{love}]\!] \equiv \lambda x.\textsc{love}(x)$

(61) Activities, e.g. *run*, *walk*, *swim*
a. $\lambda P \lambda x.(\textsc{do}(P))(x)$
b. $[\![\text{run}]\!] \equiv \lambda x.(\textsc{do}(\textsc{run}))(x)$

(62) Achievements, e.g. *arrive*, *find*, *reach*
a. $\lambda P \lambda x.(\textsc{become}(P))(x)$
b. $[\![\text{arrive}]\!] \equiv \lambda x.(\textsc{become}(\textsc{at a location}))(x)$

(63) Accomplishments, e.g. *open the window*, *kill Bill*, *paint a picture*
a. $\lambda P \lambda x \lambda y[\textsc{cause}(x, \textsc{become}(P(y)))$
b. $[\![\text{kill Bill}]\!] \equiv \lambda x[\textsc{cause}(x, \textsc{become}(\neg\textsc{alive}(\textsc{bill})))$

Activities (61) differ from states only in the presence of the two-place predicate modifier DO (64). The difference between the stative verb *look* and its active counterpart *see* stems only from the DO modifier ($\lambda x.\textsc{look}(x)$ and $\lambda x.(\textsc{do}(\textsc{look}))(x)$, respectively). DO takes the agent α and the sentence ϕ, and contributes something similar to the subject's intention or volition to the act, i.e. "state under the unmediated control of the agent" (Dowty 1979, p. 118).

(64) $\textsc{do}(\alpha, \phi) \leftrightarrow \phi \wedge$ under the unmediated control of the agent(ϕ)

The strength of the "unmediated control" is somewhat unclear. It is affected by the nature of the activity and other pragmatic components. The agent's control does not necessarily equal action. For example, in the sentence *The children are being quiet* there is an absence or avoidance of action (or a lot of covert action). Furthermore, DO permits inanimate subjects which cannot exert control as long as the subject undergoes an internal or external change or movement "that has visible, audible or tactile consequences" (Dowty 1979, p. 165). In short, the state is either controllable or there is a perceivable change of state. This is the reason that example (53c) ?*The river is being noisy due to the freshet* is still acceptable.

The remaining two aspectual classes, achievements (62) and accomplishments (63), are of lesser importance here. Achievements differ from states in the presence of a one-place predicate BECOME. BECOME(ϕ) expresses a change of state from $\neg\phi$ to ϕ in an interval of time at the beginning of which $\neg\phi$ holds and at the end of which ϕ holds. Accomplishments are the most complex aspectual class. They draw on BECOME, DO, and, crucially, the operator CAUSE. Unsurprisingly, ϕ CAUSE ψ is a connective between two sentences ϕ and ψ expressing causation.

Returning to the question of Sophia's being, be_1 and be_2 are simply the restatement of the familiar stative *be*s. The active be_3 is the surface manifestation of DO. In active verbs, DO is absorbed by the predicate, but it can surface as active *be*, e.g. in *Sophia is being friendly.* Although active *be* is not a central point of his calculus, recall that Dowty (1979) draws the distinction between ILPs and SLPs along the compatibility with the progressive (see also Chapter 2 Section 2.3). Dowty (1979) remains open on what the translation of be_3 is, but roughly equates it to the active *be* of Partee (1977) and Carlson (1977).

3.1.4 Stump (1985)

Stump (1985) expands on Carlson's (1977) ontology and *be* taxonomy. Instead of three *be*s, he proposes four in order to account for the combinatorics and selectional restrictions of his verbal semantics. Stump follows Carlson in assuming that SLPs are predicates that combine with stages and that ILPs are predicates that combine with individuals. His *be*-hive in (65) reflects this position. In keeping with Carlson (1977) and Dowty (1979), Stump's copula collection is centered around the predicative uses of *be*.

The first *be* in (65a) is the familiar be_1 of Carlson. This be_1 produces the existential reading of an SLP: "it is combined with stage-level predicative expressions of three different categories to produce individual-level intransitive verb phrases" (Stump 1985, p. 74). Be_1 anchors Sophia's (x^i) friendliness in space and time (y^s) through the realization relation (R). The input of this *be* is an SLP and the output in an ILP with an existential reading. Note that Stump (1985) assumes that phrases like *be asleep*, *be alone*, *be drunk*, etc. are ILPs.

The second be_2 is one that combines with individual-level predicates (P^i) and has no semantic content of its own. It is synonymous with Carlson's be_2.

However, the input and the output of this *be* are only ILPs.

The third *be*$_3$ is Partee's (1977) active *be*, and the one that appears in sentences like *be a hero* and *be obnoxious.* Following Partee (1977), Stump translates *Sophia is being friendly (or a hero)* as *Sophia is acting friendly (or like a hero).* This *be* cannot combine with predicates that the subject has no control over but it can combine with ILPs to produce SLPs. Stump assumes that animacy and agency "are probably to be regarded as conventionally implicated aspects of the meaning of *be*$_3$ rather than as part of its asserted meaning" (Stump 1985, p. 78–79).

The active *be*$_3$'s logical form is presented in (65c). Here, the copula combines with an individual-level predicate P^i and a stage variable x^s. It utilizes Carlson's realization relation $R(x^s, x^k)$ for applying stages to individuals, although in this case it applies a stage x^s to a kind (of individual) x^k. In order to reconcile kinds and objects (both of which are individuals), Stump proposes a second realization relation $R'(x^o, x^k)$ for applying an object x^o to its kind x^k (i.e. asserting that "x^o is a kind of x^k"). Since this *be* expects a stage but the subject of a sentence like *Sophia is being friendly* is an individual, there needs to be a mediating circumstance that allows *be*$_3$+adjective to combine with individuals. In order to be compatible and combine with the subject, the SLP is temporarily converted to an ILP (67d) via the conversion rule in (66).

In short, (65c) expresses that for every object there is an equivalence between the ILP applied to the object and the realization of a kind in an individual. In addition, the (kind of) individual is realized in some stage. The input of this *be* is an SLP and the output is an ILP. Since this crucial *be*$_3$ is somewhat complex, example (67) illustrates the derivation of the phrase *John is obnoxious.* In essence, *John is being obnoxious* can be paraphrased as *John is being the kind of person who is obnoxious* (Stump 1985, p. 78).

(65) a. $[\![\text{be}_1]\!] \equiv \lambda P^s \lambda x^i\ \exists y^s[R(y^s, x^i) \wedge P^s(y^s)]$ Carlson's *be*$_1$ (54)

b. $[\![\text{be}_2]\!] \equiv \lambda P^i[P^i]$ Partee's and Carlson's *be*$_2$ (51)/(55)

c. $[\![\text{be}_3]\!] \equiv \lambda P^i \lambda x^s \exists x^k[\forall x^o[P^i(x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)]$ (52)/(56)

d. $[\![\text{be}_4]\!] \equiv \lambda P^s[P^s]$

(66) Conversion rule T21: $F(\alpha) \rightarrow \lambda x^i \exists x^s[R(x^s, x^i) \wedge \alpha'(x^s)]$ SLP → ILP

(67) John is obnoxious.

a. $[\![\text{John}]\!] \equiv \textsc{john}$

b. $[\![\text{obnoxious}]\!] \equiv \lambda x[\textsc{obnoxious}(x)]$

c. $[\![\text{be}_3\ \text{obnoxious}]\!] \equiv \lambda P^i \lambda x^s \exists x^k[\forall x^o[P^i(x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)](\lambda x[\textsc{obnoxious}(x)])$
$\equiv \lambda x^s \exists x^k[\forall x^o[\lambda x[\textsc{obnoxious}(x)](x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)]$
$\equiv \lambda x^s \exists x^k[\forall x^o[\textsc{obnoxious}(x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)]$

d. $[\![\text{be}_3\ \text{obnoxious}]\!]$
$\equiv \lambda x^i \exists x^s[R(x^s, x^i) \wedge \exists x^k[\forall x^o[\textsc{obnoxious}(x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)]]$ conversion to ILP

e. $[\![\text{John is obnoxious}]\!]$
$\equiv \lambda x^i \exists x^s [R(x^s, x^i)\ \&\ \exists x^k [\forall x^o [\textsc{obnoxious}(x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)](\textsc{john})$
$\equiv \exists x^s [R(x^s, \textsc{john}) \wedge \exists x^k [\forall x^o [\textsc{obnoxious}(x^o) \Leftrightarrow R'(x^o, x^k)] \wedge R(x^s, x^k)]$

The final be_4 is the passive *be*, as in *be arrested* and *be thrown into the Vistula*. It combines with an SLP P^s to form stage-level intransitive verb phrases, but – just like be_2 – is otherwise semantically empty. The input and output of this *be* are SLPs.

Stump (1985) covers all permutations of the copula with stage-level and individual-level predicates in his taxonomy. Be_1 seeks an SLP complement and yields an ILP, be_2 seeks an ILP complement and returns it unchanged, be_3 seeks an ILP complement and yields an SLP, and finally be_4 seeks an SLP complement and returns it unchanged. Sophia's being friendly is possible, because *friendly* is compatible with be_3, whereas being intelligent is ruled out, somewhat vaguely, because Sophia cannot have control over that property.

3.1.5 Diesing (1992) and Kratzer (1995)

In order to reconcile their theories of stage-level and individual-level predicates with *be*, both Diesing (1992) and Kratzer (1995) follow Stump (1985) in assuming the existence of multiple copulas. Specifically, Diesing adopts his be_4 (65d) for the raising Infl and be_2 (65b) for the control Infl (see Figure 2.2 in Section 2.4 of the previous chapter). Since both copulas are identity functions, they are of no further importance to Diesing beyond being suitable for their respective syntactic structures.

Kratzer (1995) also assumes the existence of two copulas. Furthermore, she argues that copula-predicate combinations behave like other verbs in relation to Davidsonian eventualities (see also Chapter 4). Examples (68)–(70) illustrate how, according to Kratzer (1995), the derivations of the copulas together with an SLP or an ILP take place.

The individual-level predicate in (68) is straightforward. The predicate applies to the subject with minimal interference of the copula. The derivation of the stage-level interpretations in (69) and (70) is slightly different. The stage-level predicate carries a variable l ranging over spatio-temporal locations (see also Chapter 2 Section 2.5).

This is even clearer in (70), where the space and time are explicitly specified: Sophia is famished at the gym precisely at noon today. The l variable is left free. It may be bound by the generic null operator *Gen* or by some other quantifier if the sentence is part of a larger utterance construction. Furthermore, Kratzer leaves open the option that the variable may be filled in by the context.

(68) Sophia is friendly. ILP

a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}$
b. $[\![\text{be}_2]\!] \equiv \lambda P^i [P^i]$ = (65b)
c. $[\![\text{friendly}]\!] \equiv \lambda x [\textsc{friendly}(x)]$

d. $[\![\text{be}_2 \text{ friendly}]\!] \equiv \lambda P^i[P^i](\lambda x[\text{FRIENDLY}(x)]) \equiv \lambda x[\text{FRIENDLY}(x)]$

e. $[\![\text{Sophia is friendly}]\!] \equiv \lambda x[\text{FRIENDLY}(x)](\text{SOPHIA})$
$\equiv \text{FRIENDLY}(\text{SOPHIA})$

(69) Sophia is (being) friendly. SLP

a. $[\![\text{be}_4]\!] \equiv \lambda P^s[P^s]$ = (65d)

b. $[\![\text{friendly}]\!] \equiv \lambda x \lambda l[\text{FRIENDLY}(x, l)]$ cf. (31)

c. $[\![\text{be}_4 \text{ friendly}]\!] \equiv \lambda P^s[P^s](\lambda x \lambda l[\text{FRIENDLY}(x, l)])$
$\equiv \lambda x \lambda l[\text{FRIENDLY}(x, l)]$

d. $[\![\text{Sophia is friendly}]\!] \equiv \lambda x \lambda l[\text{FRIENDLY}(x, l)(\text{SOPHIA})]$
$\equiv \lambda l[\text{FRIENDLY}(\text{SOPHIA}, l)]$
$\equiv \text{Gen } l[\text{FRIENDLY}(\text{SOPHIA}, l)]$ binding by generic operator

(70) Sophia is hungry at the gym at noon.

a. $[\![\text{hungry}]\!] \equiv \lambda x \lambda l[\text{HUNGRY}(x, l)]$

b. $[\![\text{at the gym}]\!] \equiv \lambda x \lambda l[\text{AT GYM}(x, l)]$

c. $[\![\text{at noon}]\!] \equiv \lambda x \lambda l[\text{AT NOON}(x, l)]$

d. $[\![\text{Sophia is hungry at the gym at noon}]\!]$
$\equiv \lambda x \lambda l[\text{HUNGRY}(x, l) \wedge \text{AT GYM}(x, l) \ \& \ \text{AT NOON}(x, l)](\text{SOPHIA})$
$\equiv \lambda l[\text{HUNGRY}(\text{SOPHIA}, l) \wedge \text{AT GYM}(\text{SOPHIA}, l) \wedge$
$\text{AT NOON}(\text{SOPHIA}, l)]$ variable l left free

In sum, both Diesing (1992) and Kratzer (1995) assume the existence of at least two copulas, each compatible with their respective predicate types. While Diesing hypothesizes that both copulas make no semantic contribution, Kratzer proposes that the SLP-compatible copula carries a variable for times and locations, which the ILP one lacks. Neither Diesing (1992) nor Kratzer (1995) discuss other uses of *be*.

3.1.6 Becker (2004)

Becker (2002, 2004a,b) argues in favor of a distinction between the overt uninflected copula (71a) on the one hand, and the finite and null forms of the copula (71b)–(71d) on the other. According to Becker, the former is the head of a VP projection, whereas the latter are heads of IP.

(71) a. Billy wants to be a goat.
b. Billy is a goat.
c. Billy is being kind to the goat.
d. Billy ∅ in the meadow.

Becker (2002) argues that *be* is a full, raising verb (Stowell 1978) which is semantically empty and *is* is a morphosyntactic reflex which offers temporal anchoring. *Is* is inserted in the Infl-position to spell out finiteness features of the main clause if no verb is present. Becker claims that the previously mentioned morphological, syntactic, and semantic differences in Standard American English, paired with examples from African American English, Child

Standard English, Irish, Spanish, Portuguese, and Hebrew, point to such a distinction.

In sum, Becker's semantic arguments are in line with Partee (1977), but she proposes that the lexical difference comes from entirely different verbs, as opposed to several homophonous copulas with different properties.

3.2 Solitary *Be*

The approaches that propose a swarm of copulas have been challenged on many points. Why would so many languages have multiple homophonous *be*s, especially since the theorized contribution of some of them is minimal? The syntactic and semantic arguments for the existence of multiple *be*s are riddled with counterexamples.

The notion of a progressive *be* is especially problematic. The selectional restrictions and distribution proposed by Partee (1977) and Dowty (1979) for agentive *be* are imprecise (see e.g. (72)–(73) and Rothstein 1999). Whether an adjective is grammatical in the progressive hinges on its (further undefined) acceptability with an agentive *be*. Both stative and agentive *be*s are compatible with adjectival predicates and other complements, and they are virtually identical but for the very loosely specified control or volition.

Acting or volition, which are a prerequisite for e.g. Partee (1977) and Dowty (1979), are not always present in perfectly grammatical sentences, such as those listed (73), adapted from Rothstein (2004). All the sentences in (73) are grammatical, but the subjects cannot be attributed (unmediated) control of their behavior. In (73a), Julian is being impolite to the queen and, while his actions are voluntary, he is not being impolite on purpose, and therefore he cannot cease being so. In (73b), as already frequently noted, the river cannot have volition and control over its volume. The birds in (73c) are animate, but are acting out of instinct and lack the self-reflection to control their behavior. Lastly, the way a baby is acting while cutting new teeth cannot be attributed to control or volition.

(72) Sophia made Michael $\emptyset$/be$_{active}$/*be$_{stative}$ friendly/awake/insane.

(73) a. Julian was unintentionally impolite to the queen, because he is unfamiliar with the diplomatic protocol.
b. ?The river is being noisy after last night's torrential downpour.
c. The birds are being very noisy this morning.
d. The baby is being difficult this evening; I think she is teething.

However, the solution of generating *be*s has convincing alternatives, which do not necessitate such multiplication in the lexicon. In order to sidestep having to postulate several *be*s, the theories presented below unite the stative and agentive uses of the copula in one form.

3.2.1 Partee (1986)

In later work, Partee revises her views on the semantics of *be* (Partee 1986, 2008). Following Williams (1983), she proposes that there is only one stative *be*, but it has a polymorphic type, granting it unique flexibility. According to Partee, the copula in (74b) requires a pair of arguments: x of type e and P of type $\langle e,t\rangle$, in either order. Partee (2008) treats the copula as an "apply predicate" function that imposes no sortal restrictions of its own, as long as its $\langle e,t\rangle$ argument predicates over its e argument. As a result, *be* returns the property that it takes as an argument.

The predicational use of *be* is illustrated in (74). In this case, *be* receives both an e argument and an $\langle e,t\rangle$ argument (*Sophia* and *friendly*, respectively); therefore, no type-shifting is necessary. However, what if deceitful Sophia is only acting friendly? Partee (2008) admits that her proposal does not account for the differences between *friendly* and *be(ing) friendly*. She points to how Stump (1985) treats *be* as a sort-shifting mechanism that turns SLPs into ILPs but is otherwise "semantically transparent" (cf. Stump's *be*$_3$ (65c)).

The equative use of *be* is illustrated in (77). Here, the copula is given two arguments of type e, but the sentence is somehow still well-formed. In this case, grammaticality is achieved by applying the type-shifting operation IDENT (75) to the individual Juliette to fulfill the selectional restrictions of the copula. The IDENT operation maps an individual onto the property of being said individual, changing Juliette's type from e to $\langle e,t\rangle$. Thus, the selectional restrictions of *be* are met.

In (78), the opposite problem occurs and is solved in an analogous manner. *A hero* has a more complex type than required by *be*. The type-shifting operation BE (76) lowers the complex type $\langle\langle e,t\rangle,t\rangle$ to a simpler one $\langle e,t\rangle$, thereby making *a hero* an appropriate complement for the copula. Although similar in name, the type-shifting operation BE (76) should not be confused with English copula *be* (74b).

(74) Sophia is friendly.
   a. $[\![\text{Sophia}]\!] \equiv \text{SOPHIA}$ — type e
   b. $[\![\text{be}]\!] \equiv \lambda P \lambda x[P(x)]$
   c. $[\![\text{friendly}]\!] \equiv \lambda x[\text{FRIENDLY}(x)]$ — type $\langle e,t\rangle$
   d. $[\![\text{is friendly}]\!] \equiv \lambda P \lambda x[P(x)](\lambda x[\text{FRIENDLY}(x)])$
      $\equiv \lambda x[\text{FRIENDLY}(x)]$
   e. $[\![\text{Sophia is friendly}]\!] \equiv \lambda x[\text{FRIENDLY}(x)](\text{SOPHIA})$
      $\equiv \text{FRIENDLY}(\text{SOPHIA})$

(75) IDENT: $\lambda y \lambda x[x = y]$ — $e \to \langle e,t\rangle$

(76) BE: $\lambda P \lambda x[P(\lambda y[x = y])]$ — $\langle\langle e,t\rangle,t\rangle \to \langle e,t\rangle$

(77) Sophia is Juliette.
   a. $[\![\text{Juliette}]\!] \equiv \text{JULIETTE}$ — type e
   b. $[\![\text{(be) Juliette}]\!] \equiv \lambda y \lambda x[x = y](\text{JULIETTE})$ — IDENT
      $\equiv \lambda x[x = \text{JULIETTE}]$ — type $\langle e,t\rangle$

c. $[\![\text{be Juliette}]\!] \equiv \lambda P \lambda x[P(x)](\lambda x[x = \text{JULIETTE}])$
$\equiv \lambda x[x = \text{JULIETTE}]$

d. $[\![\text{Sophia is Juliette}]\!] \equiv \lambda x[x = \text{JULIETTE}](\text{SOPHIA})$
$\equiv [\text{SOPHIA} = \text{JULIETTE}]$

(78) Sophia is a hero.

a. $[\![\text{a hero}]\!] \equiv \lambda Q \exists z[\text{HERO}(z) \wedge Q(z)]$ type $\langle\langle e,t\rangle,t\rangle$

b. $[\![\text{(be) a hero}]\!] \equiv \lambda P \lambda x[P(\lambda y[x = y])](\lambda Q \exists z[\text{HERO}(z) \wedge Q(z)])$ BE
$\equiv \lambda x[\lambda Q \exists z[\text{HERO}(z) \wedge Q(z)](\lambda y[x = y])]$
$\equiv \lambda x[\exists z[\text{HERO}(z) \wedge \lambda y[x = y](z)]]$
$\equiv \lambda x[\exists z[\text{HERO}(z) \wedge [x = z]]]$ type $\langle e,t\rangle$

c. $[\![\text{is a hero}]\!] \equiv \lambda P \lambda x[P(x)](\lambda x[\exists z[\text{HERO}(z) \wedge [x = z]]])$
$\equiv \lambda x[\lambda x[\exists z[\text{HERO}(z) \wedge [x = z]]](x)]$
$\equiv \lambda x[\exists z[\text{HERO}(z) \wedge [x = z]]]$

d. $[\![\text{Sophia is a hero}]\!] \equiv \lambda x[\exists z[\text{HERO}(z) \wedge [x = z]]](\text{SOPHIA})$
$\equiv \exists z[\text{HERO}(z) \wedge [\text{SOPHIA} = z]]$

Partee (1986, 2008) makes the first step towards unifying the copula's uses in one elegant proposal. Her polymorphic copula, flanked by type-shifting operations, is able to account for most of *be*'s tasks. Nevertheless, the central question of how to actively be friendly remains unanswered.

3.2.2 Rothstein (1999)

Rothstein (1999, 2004) follows Partee (1986) and Williams (1983) in assuming that there can be only one *be*, but departs from their assumption that *be* is semantically vacuous. If that were the case, the sentences in (79) (adapted from Rothstein 1999) should be equal in meaning and acceptability. Nevertheless, (79a) *feels* somewhat more individual or general than (79c). Another difficulty with Partee's claim that *be* makes no semantic contribution to the sentence beyond function application is (79b). If *be* adds nothing to the sentence, why is (79b) so much worse than (79a)/(79c)? Lastly, as mentioned before, Partee (1986) can also not account for the all too familiar agentivity effect in (1).

(79) a. Mary considers Jane polite.
b. *Mary considers Jane be polite.
c. Mary considers Jane to be polite.

(1) a. Sophia is friendly/noisy/intelligent/retired.
b. Sophia is being friendly/noisy/*intelligent/*retired.

Rothstein argues that *be* – like any ordinary verb – introduces a Davidsonian eventuality argument. However, unlike other verbs, it does not express any property of that argument: neither the kind of event, nor what thematic roles the participants have. In other words, *be* is underspecified (or undetermined) relative to the type of situation it refers to. The lexical content is provided by the predicate.

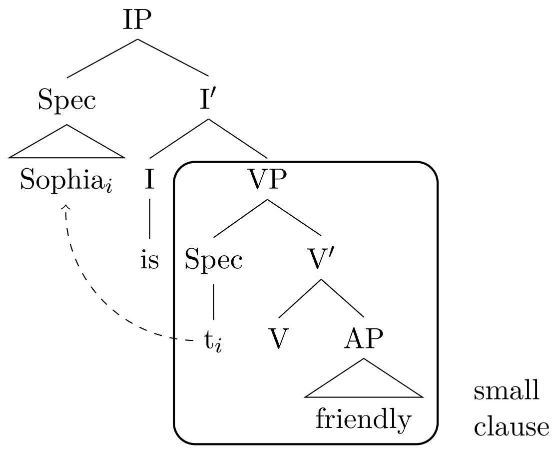


Figure 3.1: Structure of the small clause complement of *be*. The subject of the small clauses raises to the Spec IP position to be the sentence subject, leaving behind a trace t_i.

This warrants a brief digression into the predicate. Rothstein (1999, 2000, 2004) operates within a neo-Davidsonian framework in which verbs and adjectives denote sets of eventualities. She posits that adjectival predicates introduce an eventuality argument and argument roles *Arg*, which are functions from states to their participants.

According to Rothstein, adjectives and adjective phases (APs) denote sets of mass states (M-states) of type $\langle s_e, t \rangle$, i.e. functions from state eventualities to truth values. M-states are non-atomic, mass, non-countable, state-like eventualities. (80) illustrates the denotations of two adjectives: the stage-level predicate *friendly* and the individual-level predicate *intelligent*. Both are identical except for the predicates' content: they expect an individual x and a state eventuality s as arguments and link them through the argument role assignment function *Arg*.

The denotations of verbs and verbal phrases (VPs) are sets of atomic (count) eventualities. Verbs introduce thematic roles (Θ), which are functions from events to their participants. (81) illustrates the denotation of a simple one-place predicate *run*, which takes an individual x and an event e as arguments and assigns the (agent) Θ-role to the individual.

(80) a. $[\![\text{friendly}]\!] \equiv \lambda x \lambda s\ \textsc{friendly}(s) \wedge Arg(s) = x$

b. $[\![\text{intelligent}]\!] \equiv \lambda x \lambda s\ \textsc{intelligent}(s) \wedge Arg(s) = x$

(81) $[\![\text{run}]\!] \equiv \lambda x \lambda e\ \textsc{run}(e) \wedge \Theta(e) = x$

Returning to the copula, Rothstein (1999) follows Stowell (1978) in assuming that *be* is a raising verb that takes a small clause complement, as in Figure 3.1 and example (82d).

As previously mentioned, *be* introduces a Davidsonian eventuality argument, similarly to a regular verb such as (81), but it lacks both the information about the kind of argument and the thematic roles. Instead, Rothstein's *be* (82b) is a function "instantiate", which maps from the domain of mass states to the domain of Davidsonian eventualities. The copula expects two arguments: a set of M-states S and an eventuality e. The function l locates the M-state s in the domain of Davidsonian eventualities. In other words, *be* packages (i.e. presents from a count perspective) a mass state into an atomic eventuality.[1]

What better way to explain the effect the copula has on the adjective than by analyzing the familiar sentence *Sophia is friendly* in (82). First, the adjective (82c) undergoes two computational steps in order to make it an appropriate complement for the copula. The result of these operations (82d) is, for the purpose at hand, equivalent to the initial adjective.

Next, the AP combines with the copula. The AP in (82d) has its denotation in the (non-atomic) set of states, which is compatible with the copula's argument expectation. The application of *be* to the adjective in (82e) results in the equivalent of a verb (e.g. (81)), because the copula packaged (i.e. presented) the AP as a set of eventualities. Unlike the AP, the combination *be*+AP has its denotation in the events (atomic) domain. In the course of presentation, the AP becomes an eventuality and is temporally located through the copula. In other words, *be friendly* in (82e) "denotes a set of atomic eventualities with all the properties of count entities" (Rothstein 2004, p. 297).

Lastly, the copula and AP compose with the subject. Overall, (82) can be paraphrased as "there is a present event which packages some state of Sophia having the friendly property."

In the derivation, Rothstein makes use of two other operations: predicate abstraction (or formation) and existential closure. Predicate abstraction is an automatic operation that turns VPs and other similar XPs into semantic predicates. It is independent of the thematic properties of the phrase head. Existential closure is the previously mentioned operation that inserts an existential quantifier, which binds all free variables in its scope (Heim 1982).

(82) Sophia is friendly.

a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}$

b. $[\![\text{be}]\!] \equiv \lambda S \lambda e \exists s \in S : e = l(s)$ — instantiation relation

c. $[\![\text{friendly}]\!] \equiv \lambda s\ \textsc{friendly}(s) \wedge Arg_1(s) = x$
$\equiv \lambda x \lambda s\ \textsc{friendly}(s) \wedge Arg_1(s) = x$ — predicate abstraction

d. $[\![\text{(be) friendly}]\!] \equiv \lambda x \lambda s\ \textsc{friendly}(s) \wedge Arg_1(s) = x\ (x)$
$\equiv \lambda s\ \textsc{friendly}(s) \wedge Arg_1(s) = x$ — small clause

e. $[\![\text{be friendly}]\!]$
$\equiv [\lambda S \lambda e \exists s \in S : e = l(s)](\lambda s\ \textsc{friendly}(s) \wedge Arg_1(s) = x)$
$\equiv \lambda e \exists s \in \lambda s\ \textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)$
$\equiv \lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)]$ — verb equivalent
$\equiv \lambda x \lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)]$ — predicate abstraction

f. $[\![\text{is friendly}]\!]$
$\equiv \lambda x \lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s) \wedge \textsc{pres}(e)]$

[1] Rothstein (1999) makes use of two complementary operations she calls *packaging* and *grinding*. Roughly, grinding breaks down a bicycle to a mass of its parts and packaging puts it back together.

g. $[\![$Sophia is friendly$]\!]$
$\equiv \lambda x \lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s) \wedge \textsc{pres}(e)](\textsc{sophia})$
$\equiv \lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = \textsc{sophia} \wedge e = l(s) \wedge \textsc{pres}(e)]$
$\equiv \exists e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = \textsc{sophia} \wedge e = l(s) \wedge \textsc{pres}(e)]$
existential closure

What is ultimately the nature of Sophia's friendliness in (82)? Since *be*+AP is freer than other verbs, it can move between various aspectual classes. Whether Sophia is an agreeable person or is acting the part depends on the interaction between many factors: the adjective, the discourse and sentence contexts, the linguistic particularities of the sentence, or a myriad of different pragmatic influences. Therefore, (82) can fit any pragmatically appropriate lexical class.

Rothstein argues that the default lexical classification of a sentence such as (82) is to a stative interpretation, because that is the simplest aspectual class: "the stative reading will be the unmarked or default class for all be + AP meanings" (Rothstein 1999, p. 404; cf. Dowty's classification of verbs in (60)–(63)). Rothstein argues that, in the absence of other factors, defaulting to a state follows from the maxim of quantity (*be maximally informative and concise*, Grice 1989).

If there is reason to specify the copula+AP construction to a different lexical class, this requires little effort for both activities and achievements in most cases. Interpreting copula+AP construction as an accomplishment is also possible, but it requires strong contextual support. All things considered, the aspectual class of a copula predicate construction depends on how one wants to analyze the eventuality.

The progressive is one instance where the copula-adjective pairing must be specified non-statively, because the progressive can only apply to activities. In order to derive *Sophia is being friendly*, Rothstein adopts Landman's (1992) progressive operator PROG as in (83), where e and e' are event variables and Ag is the agent thematic role. The progressive operator is applied to the verbal phrase, which is specified to an activity in (84a). This interpretation is achieved by applying the activity scheme (61), which Rothstein adapts from Dowty (1979). Rothstein makes use of one more operation, namely *event identification* (Kratzer 1996). In a nutshell, event identification connects two seemingly separate events if they are in fact the same event. Once PROG has been applied to the copula+AP construction, the computation continues analogously to example (82).

(83) $\textsc{being}(\mathrm{VP}) \rightarrow \lambda e[\textsc{prog}(e, \lambda e'[\mathrm{VP}(e') \wedge Ag(e') = x])]$

(84) Sophia is being friendly.

a. $[\![$be friendly$]\!]$
$\equiv \lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)]$
= (82e), underspecified
$\equiv \lambda P \lambda e[\textsc{do}(P)](e)(\lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)])$
activity template (61)
$\equiv \lambda e[\textsc{do}(\lambda e \exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)])](e)$

$\equiv \lambda e[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)])]$

event identification

b. ⟦be being friendly⟧
$\equiv \lambda e\big[\textsc{prog}\big(e, \lambda e'\big[\lambda e[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e = l(s)])]\big](e') \wedge Ag(e') = x\big)\big]$ prog
$\equiv \lambda e\big[\textsc{prog}\big(e, \lambda e'\big[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e' = l(s)])\big] \wedge Ag(e') = x\big)\big]$
$\equiv \lambda x \lambda e\big[\textsc{prog}\big(e, \lambda e'\big[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e' = l(s)])\big] \wedge Ag(e') = x\big)\big]$ predicate abstraction

c. ⟦is being friendly⟧
$\equiv \lambda x \lambda e\big[\textsc{prog}\big(e, \lambda e'\big[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e' = l(s)])\big] \wedge Ag(e') = x \wedge \textsc{pres}(e')\big)\big]$

d. ⟦Sophia is being friendly⟧
$\equiv \lambda x \lambda e\big[\textsc{prog}\big(e, \lambda e'\big[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = x \wedge e' = l(s)])\big] \wedge Ag(e') = x \wedge \textsc{pres}(e')\big)\big](\textsc{sophia})$
$\equiv \lambda e\big[\textsc{prog}\big(e, \lambda e'\big[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = \textsc{sophia} \wedge e' = l(s)])\big] \wedge Ag(e') = \textsc{sophia} \wedge \textsc{pres}(e')\big)\big]$
$\equiv \exists e\big[\textsc{prog}\big(e, \lambda e'\big[\textsc{do}(\exists s[\textsc{friendly}(s) \wedge Arg_1(s) = \textsc{sophia} \wedge e' = l(s)])\big] \wedge Ag(e') = \textsc{sophia} \wedge \textsc{pres}(e')\big)\big]$ existential closure

For *be* of identity, Rothstein adopts Partee's (1986) approach of using a type-shifting operation on a non-predicate complement. Instead of Partee's IDENT operator (75), Rothstein proposes a lifting function LIFT as in (85). Here, $\uparrow (x)(s)$ is the relation between x and s "the state of being x." A derivation of this use of *be* is illustrated in (86), which can be paraphrased as "there is a present eventuality which packages the state of the CEO being Sophia."

(85) $\textsc{lift}(\text{Sophia}) \equiv \lambda s. \uparrow \textsc{sophia}(s) \wedge Arg_1(s) = x$ compare unlifted (86c)

(86) The CEO is Sophia

a. ⟦The CEO⟧ $\equiv$ THE CEO

b. ⟦be⟧ $\equiv \lambda S \lambda e \exists s \in S : e = l(s)$

c. ⟦Sophia⟧ $\equiv$ SOPHIA

d. ⟦be Sophia⟧ $\equiv \lambda S \lambda e \exists s \in S : e = l(s)(\textsc{lift}(\textsc{sophia}))$ lifting
$\equiv \lambda S \lambda e \exists s \in S : e = l(s)(\lambda s. \uparrow \textsc{sophia}(s) \wedge Arg_1(s) = x)$
$\equiv \lambda e \exists s[\uparrow \textsc{sophia}(s) \wedge Arg_1(s) = x \wedge e = l(s)]$
$\equiv \lambda x \lambda e \exists s[\uparrow \textsc{sophia}(s) \wedge Arg_1(s) = x \wedge e = l(s)]$ predicate formation

e. ⟦is Sophia⟧
$\equiv \lambda x \lambda e \exists s[\uparrow \textsc{sophia}(s) \wedge Arg_1(s) = x \wedge e = l(s) \wedge \textsc{pres}(e)]$

f. ⟦The CEO is Sophia⟧ $\equiv \lambda x \lambda e. \exists s[\uparrow \textsc{sophia}(s) \wedge Arg_1(s) = x \;\&\; e = l(s) \wedge \textsc{pres}(e)](\textsc{the ceo})$
$\equiv \lambda e. \exists s[\uparrow \textsc{sophia}(s) \wedge Arg_1(s) = \textsc{the ceo} \;\&\; e = l(s) \wedge \textsc{pres}(e)]$
$\equiv \exists e. \exists s[\uparrow \textsc{sophia}(s) \wedge Arg_1(s) = \textsc{the ceo} \;\&\; e = l(s) \wedge \textsc{pres}(e)]$

existential closure

In sum, Rothstein (1999, 2004) argues for an underspecified copula, which adopts the aspectual flavor of the predicate. Rothstein's proposal unifies the different incarnations of *be* into one coherent picture. It has the benefits of Partee's (1986; 2008) solution, while addressing its weak points. Unlike the latter, Rothstein can explain the alterations in (79) and (1). The selectional restrictions of the verb *consider* in (79) require it to combine with a state or proposition. Both the adjective *polite* and the inflectional phrase *to be polite* fulfill these requirements, but *be polite* is a verb and, in failing to satisfy the verb's requirements, leads to ungrammaticality.

The other missing copular puzzle piece, the agentive alternation in (1) was outlined in the discussion on the aspectual class of Sophia's friendliness. In short, one of the ways of arriving at the agentive interpretation of (1) is through the Gricean maxim of quantity: why bother saying *is being polite* to mean *is polite* if the latter is more economical?

3.2.3 Jäger (1999)

Jäger (1999, 2001, 2003), along with e.g. higginbotham1985, kratzer1995, rothstein1999, chierchia1995, hoopswart1990, argues that all predicates have a Davidsonian argument. However, he localizes the source of the argument outside of the copula (see also Roy 2013). The situation argument is provided by the predicate and is subsequently absorbed by the copula, which in turn returns an eventuality.

Situations are akin to events in Davidsonian semantics. They have a spatio-temporal location and can be perceived. "Situations and events seem to be the same kinds of things. If situations are particulars, so are events. If situations are built from relations and individuals standing in those relations, so are events" (Kratzer 2019).

Jäger's approach is similar to Carlson's (1977) SLP copula (54) in that one of the arguments, namely the eventuality, requires type-shifting. Recall that for Carlson the subject and the predicate are ontologically incompatible and require a mediating shifting operation on the subject. Jäger posits that copular constructions are always stative and the semantic contribution of *be* is in performing a sortal shift from unrestricted situations to world size situations. He contrasts world size situations (e.g. *Bogdan is pedantic*), which are temporally localizable, but so large that they cannot be perceived, with world time slices (e.g. *Bogdan as a manager is pedantic*), which are smaller and perceivable, and have a spatio-temporal location.

The lexical entry for the copula *be* proposed by Jäger (2003) within the Discourse Representation Theory (DRT) framework (Kamp 2002; Kamp and Reyle 1993) is depicted in the discourse representation structure (DRS) in Figure 3.2a.[2] The corresponding predicate logic form is presented in (87c).

The copula introduces a situation s and restricts it to a temporal slice of the world of evaluation w_0. The world of evaluation itself is restricted to being a member $\in$ of the set of world size situations WS. The predicate introduces an underspecified parameter $\boldsymbol{P}$ and relates it to the subject and the state. Through this parameter, it is presupposed that some unspecified property holds of the subject. The unspecified property becomes contextually

[2]For a brief introduction to Discourse Representation Theory, see Appendix A.

$$\begin{array}{|c|}\hline s\ v\ w_0 \\ \hline \textsc{sophia}(v) \\ \textsc{friendly}(v, s, \boldsymbol{P}) \\ \boldsymbol{P}(s, v) \\ s \sqsubseteq w_0 \\ w_0 \in \mathrm{WS} \\ \hline \end{array} \qquad \begin{array}{|c|}\hline s\ v\ w_0 \\ \hline \textsc{john}(v) \\ \textsc{judge}(s, v) \\ s \sqsubseteq w_0 \\ w_0 \in \mathrm{WS} \\ \hline \end{array} \qquad \begin{array}{|c|}\hline s\ v\ w_0 \\ \hline \textsc{john}(v) \\ s \sqsubseteq w_0 \\ w_0 \in \mathrm{WS} \\ \hline \end{array}$$

(a) *Sophia is friendly.* (b) *John is a judge.* (c) *John as John is John.*

Figure 3.2: Discourse representation structures of different uses of the copula, following Jäger (1999). The variables: $\boldsymbol{P}$ = underspecified parameter, s = situation, v = discourse referent, w_0 = the world of evaluation, WS = set of world size situations, y = individual, $\sqsubseteq$ = the partial order relation (used here for temporal ordering of situations).

specified in the course of composition. Sentence (87) can be interpreted as "it holds of Sophia that in this possible world she is presently friendly."

(87) Sophia is friendly.

a. $[\![\text{Sophia}]\!] \equiv [v|\textsc{sophia}(v)]$

b. $[\![\text{friendly}]\!] \equiv \lambda x \lambda y[\textsc{friendly}(y, x, \boldsymbol{P})]$

c. $[\![\text{be}]\!] \equiv \lambda Q \lambda x \lambda w.[s|Q(s, x), w \in \mathrm{WS}, s \sqsubseteq w]$

d. $[\![\text{be friendly}]\!]$
$\equiv \lambda Q \lambda x \lambda w.[s|Q(s, x), w \in \mathrm{WS}, s \sqsubseteq w](\lambda x \lambda y[\textsc{friendly}(y, x, \boldsymbol{P})])$
$\equiv \lambda x \lambda w.[s|\lambda x \lambda y[\textsc{friendly}(y, x, \boldsymbol{P})](s, x), w \in \mathrm{WS}, s \sqsubseteq w]$
$\equiv \lambda x \lambda w.[s|\lambda y[\textsc{friendly}(y, x, \boldsymbol{P})](s), w \in \mathrm{WS}, s \sqsubseteq w]$
$\equiv \lambda x \lambda w.[s|\textsc{friendly}(s, x, \boldsymbol{P}), w \in \mathrm{WS}, s \sqsubseteq w]$

e. $[\![\text{Sophia is friendly}]\!]$
$\equiv \lambda x \lambda w.[s|\textsc{friendly}(s, x, \boldsymbol{P}), w \in \mathrm{WS}, s \sqsubseteq w]([v|\textsc{sophia}(v)])$
$\equiv \lambda w.[v, s|\textsc{sophia}(v), \textsc{friendly}(s, v, \boldsymbol{P}), w \in \mathrm{WS}, s \sqsubseteq w]$

f. $[\![\text{Sophia is friendly}]\!] \equiv \lambda w.[v, s|\textsc{sophia}(v), \textsc{friendly}(s, v, \boldsymbol{P}),$
$w \in \mathrm{WS}, s \sqsubseteq w](w_0)$ anchoring to the world of evaluation
$\equiv [w_0, v, s|\textsc{sophia}(v), \textsc{friendly}(s, v, \boldsymbol{P}), w_0 \in \mathrm{WS}, s \sqsubseteq w_0]$

g. $[\![\text{Sophia is friendly}]\!] \equiv [w_0, v, s|\textsc{sophia}(v), \textsc{friendly}(s, v, \boldsymbol{P}),$
$w_0 \in \mathrm{WS}, s \sqsubseteq w_0] \cup [|\boldsymbol{P}(s, v)]$ locally accommodating the presupposition
$\equiv [w_0, v, s|\textsc{sophia}(v), \textsc{friendly}(s, v, \boldsymbol{P}), w_0 \in \mathrm{WS}, s \sqsubseteq w_0,$
$\boldsymbol{P}(s, v)]$ = Figure 3.2a

Jäger does not discuss other uses of the copula, nor the agentive *be*; therefore, it is unclear how Sophia's active friendliness comes about. However, he presents in passing the copula's specificational use *John is a judge* and its equative use *John as John is John* as in Figure (3.2b) and Figure (3.2c), respectively. To ensure compatibility between the NP *a judge* and the copula in Figure (3.2b), Jäger makes use of the BE operator proposed by Partee (1986); see (76).

In sum, Jäger (1999, 2001, 2003) argues that the copula is stative and its main function is shifting the situation from a general to a possible world. The predicate is the source of the eventuality argument of the copula-predicate construction.

3.2.4 Maienborn (2003)

Maienborn (2003a) agrees with Rothstein (1999) and Partee (1986) that there is only one *be* but disputes its semantic vacuity and underspecification. In contrast to e.g. Rothstein (1999) and Fernald (2000), Maienborn argues that copula-predicate constructions do not introduce a Davidsonian eventuality argument. Instead, they are a different kind of entity altogether.

The copula is part of Maienborn's ontology, developed over the course of multiple publications (Maienborn 2001, 2003a,b, 2004, 2005, 2019). Maienborn reexamines the ontological properties of states and events. She subdivides the former into *Davidsonian eventualities*, *Kimian states*, and *tropes*.

The category of Davidsonian eventualities encompasses events (e.g. *arrive*, *win*, *buy*, *find*), processes (e.g. *play*, *run*, *swim*, *eat*), and Davidsonian states (or D-states, e.g. *sleep*, *stand*, *sit*, *hang*). Davidsonian eventualities are, "particular spatiotemporal entities with functionally integrated participants" (Maienborn 2019, p. 88). They are characterized by being (i) perceptible; (ii) located in space and time; (iii) causally efficacious; (iv) not closed under complementation; (v) having a unique manner of realization; and (vi) involving participation.

Consider the following example. The event of the Ammertalbahn train arriving 15 minutes late at Tübingen central station at platform 13 is easy to notice by sight and hearing. This event is a particular occurrence, though far from a unique one. It has the effect of causing a sigh of relief from the passengers, who participate in the arrival. Lastly, the result of negating said event "the Ammertalbahn *didn't arrive* at Tübingen central station" is itself not an event.

Kimian states (or K-states, e.g. copular *be*, *weigh*, *know*, *resemble*, *own*; (Asher 2000; J. Kim 1969, 1976)), "are abstract objects for the exemplification of a property P at a holder x and a time t" (Maienborn 2019, p. 88). They share with Davidsonian eventualities the ability to be located in time, but differ in all other aspects. Beyond that, K-states are characterized by being (i) reified (or substantiated) entities of thought and discourse; (ii) inaccessible to direct perception, but to higher cognitive operations; (iii) closed under complementation; (iv) causally inefficacious; (v) having no spatial dimension and no unique manner of realization; and (vi) not involving participation.

To illustrate this point: suppose you own a cat. If you do, you are likely to tell your friends about how cute your cat is everywhere and all the time. Despite shooting countless pictures, your special ownership bond cannot be directly perceived and it continues on even if you are apart. Although you have owned the feline for a while now, the owning itself neither changes nor produces any results (except for the fur). Finally, the sentence *You own a cat* and its negation *You don't own a cat* express states.

Tropes (e.g. *red*, *cold*, *round*, *expensive*; Moltmann 2007, 2009, 2013) are "particular manifestations of a property in an individual" (Maienborn 2019,

p. 88). Tropes are positioned somewhere between Davidsonian eventualities and K-states. Similarly to Davidsonian eventualities, they are perceptible and causally efficacious, and they may potentially be spatio-temporally located. They share with K-states the property of not involving participation. Instead, they are manifest through their bearers.

Strawberry ice cream bears the manifestation of multiple tropes: redness, coldness, fruity sweetness, roughness of texture, etc. While eating ice cream, one should be careful. Not only can its frostiness cause brain freeze, but the melting ice cream may leave stains.

Maienborn (2003a,b) shows in a series of tests that copula-predicate constructions and other K-states fail all eventuality tests, which D-states pass. Maienborn takes this as evidence for the presence of a Davidsonian argument in Davidsonian eventualities, but concludes that there is no reason to assume the same for K-states. In other words, the copula in combination with SLP and ILP does not introduce a Davidsonian argument, and consequently there is no event-position in copula-predicate constructions.

The lexical entry for English *be* and German *sein* proposed by Maienborn is spelled out in (88b) and the computation of *Sophia is friendly* in (88). The copula in (88b) introduces a referential K-state argument s, which is characterized by the predicate P applying a trope r to an individual x (Maienborn 2019, p. 86). The adjective *friendly* in (88c) is a trope and its lexical entry features a bearerhood relation $B(x, r)$, which relates the trope r to its bearer x. In prose, the sentence expresses that there is a state that is constituted by Sophia bearing a concrete manifestation of friendliness.

The same lexical entry is presented in the DRS in Figure 3.3a. Here, the variable v relates Sophia to friendliness, s is a referential argument representing the (K-)state of affairs described by the predicate, and n represents the utterance time. The bearerhood relation and trope variables fulfill the same function as in (88). The only difference to the predicate logic variant is the additional information that the friendliness state holds at utterance time n.

(88) Sophia is friendly.

a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}$

b. $[\![\text{be}]\!] \equiv \lambda P \lambda x \lambda s \exists r[s : P(x)(r)]$

c. $[\![\text{friendly}]\!] \equiv \lambda x \lambda r[B(x, r) \wedge \textsc{friendliness}(r)]$

d. $[\![\text{be friendly}]\!]$
$\equiv \lambda P \lambda x \lambda s \exists r[s : P(x)(r)](\lambda x \lambda r[B(x, r) \wedge \textsc{friendliness}(r)])$
$\equiv \lambda x \lambda s \exists r[s : \lambda x \lambda r[B(x, r) \wedge \textsc{friendliness}(r)](x)(r)]$
$\equiv \lambda x \lambda s \exists r[s : \lambda r[B(x, r) \wedge \textsc{friendliness}(r)](r)]$
$\equiv \lambda x \lambda s \exists r[s : B(x, r) \wedge \textsc{friendliness}(r)]$

e. $[\![\text{Sophia be friendly}]\!]$
$\equiv \lambda x \lambda s \exists r[s : B(x, r) \wedge \textsc{friendliness}(r)](\textsc{sophia})$
$\equiv \lambda s \exists r[s : B(\textsc{sophia}, r) \wedge \textsc{friendliness}(r)]$

f. $[\![\text{Sophia is friendly}]\!]$
$\equiv \exists s \exists r[s : B(\textsc{sophia}, r) \wedge \textsc{friendliness}(r)]$
existential closure; = Figure 3.3a

$$\begin{array}{|c|}\hline n\ r\ s\ v \\ \hline \textsc{sophia}(v) \\ n \subseteq s \\ s : \boxed{\begin{array}{c} B(\textsc{sophia}, r) \\ \textsc{friendly}(r) \end{array}} \\ \hline \end{array}$$

(a) *Sophia is friendly.*

$$\begin{array}{|c|}\hline e\ n\ r\ s{*}\ v \\ \hline \textsc{sophia}(v) \\ n \subseteq e \\ \tau(\mathrm{s}^{*}) \subset \tau(\mathrm{e}) \\ e : \boxed{\begin{array}{c} B(\textsc{sophia}, r) \\ \textsc{friendly}(r) \\ \textsc{manifest}(s, e) \end{array}} \\ \hline \end{array}$$

(b) *Sophia is being friendly.*

Figure 3.3: Discourse representation structures for the copula and the progressive following Maienborn (2003b). The variables: B = bearerhood relation, e = event(uality), n = utterance time, r = trope, s = state, $s*$ = topic time, v = discourse referent, τ = maps situation and K-states onto their time intervals, $\subseteq$ and $\subset$ = subset and proper subset relations (used here for temporal restriction).

If, despite herself, Sophia is *being* friendly, her friendliness must shift from a K-state to an event by means of a progressive operator PROG and agentive coercion. The progressive operator is presented in (89), where τ maps situations and K-states onto their respective time intervals. PROG introduces an eventuality (e) and temporally restricts it ($\subset$) relative to the topic time (s^*). In prose, the topic time is a sub-interval of the eventuality's duration and this eventuality is predicated over by Q.

In addition to PROG, an eventive interpretation of the copula requires another compositional operation, namely coercion. Coercion is one of the central topics discussed in the next chapter. In a nutshell, it is a pragmatic phenomenon that, given the appropriate conditions, allows a cooperative listener to repair a defective expression and arrive at a grammatical interpretation.

Maienborn (2003b) posits the coercion template in (90) for solving the type conflict between the copula and a locative adverbial, such as in the sentence *Heidi war mit dem Auto in der Stadt* 'Heidi was with the car in the town.' Maienborn argues convincingly that this sentence is understood as *Heidi went by car to town*, meaning that some form of Heidi's agentivity needs to be introduced. Heidi is more likely to have driven to town than have gone sightseeing together with her car, based on world knowledge alone.

The coercion template resolves the type conflict between the argument expectation λv and the type of the encountered argument x. It allows for accommodating the predicate's argument requirements, assuming that a discourse reference y can be found that fulfills these requirements and is licensed given the appropriate context and world knowledge. The adaptation is related through the relation R for linking the presupposed referent y and the supplied argument x. The original properties of the argument P are retained.

Although the coercion template in (90) relates to agentive coercion, it is inapplicable to *Sophia is being friendly* in its present form. I propose a new coercion template for the progressive in (91) on the basis of Maienborn's original proposal and Maienborn (personal communication, September 24, 2020), Maienborn (2020). Both templates are quite similar. Crucially, the progressive variant in (91) resolves the type conflict between the expected state argument λs and the supplied event argument e by interpolating a relation R for linking the state with some underspecified activity e_{act}. As before, a successful coercion is contingent on whether a suitable activity can be found. One form that the R relation can take is MANIFEST, as in (92), where it is the manifestation of the state (*be friendly*) in the activity (*behaving friendly*).

(89) PROG: $\lambda Q \lambda s^* \exists e[e : \tau(s^*) \subset \tau(e) \wedge Q(e)]$

(90) Coercion template for locative modifiers:
$\lambda v \ldots [P(v)](x) \rightarrow \lambda y \ldots [P(y) \wedge R(y, x)]$ type conflict between v and x

(91) Coercion template for the progressive:
$\lambda s \ldots \exists s[P(s)](e) \rightarrow \lambda e_{act} \ldots \exists s[P(s) \wedge R(s, e_{act})]$
type conflict between s and e

With the help of coercion and the progressive operator, it is possible to go from stative friendliness (88) to active friendliness in (92) and Figure 3.3b. The starting point for the agentive interpretation is (88e). First, the progressive aspect is introduced by PROG. Next, in the course of composition, the type conflict in (92b) causes the sentence to be malformed. The incompatibility between the expectation of a state s and the eventuality argument e can in this case be resolved via the coercion template in (91). *Sophia is being friendly* is reinterpreted as a "friendliness manifestation" event, as intended.

In addition to the K-state s, individual v, and utterance time n variables from Figure 3.3a, the DRS for (92) in Figure 3.3b includes the time interval restriction $\tau(s^*) \subset \tau(e)$ from the progressive, the bearerhood relation B between Sophia and the friendliness trope r, and the manifestation relation MANIFEST between the K-state and event (R in (91)), resulting from coercion. The DRS in Figure 3.3b states that the subject Sophia satisfies the predicate *friendly*; this event, which exhibits the properties of a K-state, is restricted in time.

(92) #Sophia is being friendly.

a. ⟦Sophia be friendly⟧
$\equiv \lambda s \exists r[s : B(\textsc{sophia}, r) \wedge \textsc{friendliness}(r)]$ =(88e)

b. ⟦Sophia be-ing friendly⟧ $\equiv \lambda Q \lambda s^* \exists e[e : \tau(s^*) \subset \tau(e) \wedge Q(e)]$
$(\lambda s \exists r[s : B(\textsc{sophia}, r) \wedge \textsc{friendliness}(r)])$ PROG
$\equiv \lambda s^* \exists e[e : \tau(s^*) \subset \tau(e) \wedge \lambda s \exists r[s : B(\textsc{sophia}, r) \wedge$
$\textsc{friendliness}(r)](e)]$ type conflict
$\equiv \lambda s^* \exists e[e : \tau(s^*) \subset \tau(e) \wedge \lambda e_{act} \exists r[s : B(\textsc{sophia}, r) \wedge$
$\textsc{friendliness}(r) \wedge \textsc{manifest}(s, e_{act})]]$ conflict resolution via (91)

c. ⟦Sophia is being friendly⟧
$\equiv \lambda s^* \exists e[e : \tau(s^*) \subset \tau(e) \wedge \exists e_{act} \exists r[s : B(\textsc{sophia}, r) \wedge$
$\textsc{friendliness}(r) \wedge \textsc{manifest}(s, e_{act})]]$ supplies the *behaving* activity
$\equiv \exists s^* \exists e[e : \tau(s^*) \subset \tau(e) \wedge \exists e_{act} \exists r[s : B(\textsc{sophia}, r) \wedge$
$\textsc{friendliness}(r) \wedge \textsc{manifest}(s, e_{act})]]$ existential closure; = Figure 3.3b

$n\ s\ v\ y$
SOPHIA(v)
JULIETTE(y)
$n \subseteq s$
$v = y$

Figure 3.4: Discourse representation structure for *Sophia is Juliette* following Kamp and Reyle (1993). The variables: n = utterance time, s = state, v and y = individuals, $\subseteq$ = subset relation, = is equality.

Lastly, what of other uses of the copula? Maienborn does not touch on this subject, but one possibility could be a type-shifting operation, such as the one proposed by Rothstein (1999) or Dölling (1998, 1999). On the classical DRT view, Kamp and Reyle (1993) propose the DRS in Figure 3.4 for the *be* of identity.

Maienborn's approach can be summarized in two main points. The copula is part of the ontological category of K-states, an abstract object that allows a property to manifest. The phrase *Sophia is friendly* is grammatical, but *Sophia is being friendly* is defective due to a sortal conflict between the copula and the predicate. The agentive interpretation is possible through a pragmatic repair mechanism.

3.3 Chapter Summary

This chapter outlined multiple approaches to the diverse uses of the copula. The theories are grouped by whether they assume the existence of multiple *be*s or present a unified, solitary *be* account. The solution of having a singular copula that can account for both passive and active friendliness of Sophia is, in my opinion, more attractive than hypothesizing a hive of nearly indistinguishable *be*s. Going forward, I adopt the view that in English and German there is only one *be*.

Two solitary *be* theories directly address the difference between stative and agentive friendliness, as well as the meaning and grammaticality alternations in (1). Rothstein (1999) proposes that the copula is underspecified. Whether Sophia is actively or passively friendly is contingent on the predicate and the situational context. In contrast, Maienborn (2019) posits a stative copula. Sophia's passive friendliness is the result of straightforward composition, whereas her actively being friendly is the result of the repair of a defective phrase. These two theories derive their names from the mechanisms that drive the availability of an agentive interpretation. The former will henceforth be called the *Underspecification Account* and the latter the *Coercion Account*.

The Underspecification Account roots the agentive potential in the predicate and the Coercion Account in the flexibility of meaning adaptation. Both the predicate and the verb have their roles to play. The ensuing chapter investigates the theoretical and empirical foundations of underspecification and coercion, exploring along the way how the interaction between the predicate and the verb sparks agentivity.

4
Agentivity

The previous chapters explored two elements of an agentive copula construction: the predicate and the verb. The last remaining ingredient of agentivity, the subject, has so far been left out. Finally, once the agentive triumvirate is gathered, the mechanics of its combination and interaction need to be examined. The Coercion Account and the Underspecification Account are two theories that proved to be most suitable for explaining the emergence of an agentive interpretation.

This chapter addresses three issues. First, it investigates the role of the subject in agentive copular sentences beyond what has already been mentioned in passing. Second, it discusses states and events, or what it means that Sophia is passively and actively friendly. The final section is devoted to closely examining the theoretical foundations of the two mechanisms of meaning adaptation that guide the aforementioned theoretical approaches to agentivity, i.e. coercion and underspecification.

In the course of the chapter, it becomes clear what the possible paths from (1a)/(2a) to (1b)/(2b) are, why some roads are blocked, and what adventures await on either path, charting a way forward for an experimental journey in the chapters to follow.

(1) a. Sophia is friendly/noisy/intelligent/retired.
    b. Sophia is being friendly/noisy/*intelligent/*retired.
    c. The children are quiet/asleep.
    d. The children are being quiet/*asleep.

(2) a. The river is noisy/dirty/*friendly.
    b. The river is being *noisy/*dirty/*friendly.
    c. ?The river is being noisy after last night's torrential downpour.
    d. ?The river is being friendly again after the evil spirit was exorcised.

4.1 Role of the Subject

The subject of felicitous agentive copula predicate sentences must fulfill several requirements, as evident in the examples in (1)–(2). However, these requirements are quite vague. Subjects that follow or go against them may find themselves on either side of grammaticality. What are the essential qualities of an agentive subject such as Sophia?

Davidson suggested that “a person is the agent of an event if and only if there is a description of what he did that makes true a sentence that says he did it intentionally” (Davidson 1971, p. 46). Undeniably, the general consensus is that the subject of agentive copular sentences must be animate and have some level of control over the property expressed by the adjective (Dowty 1979; Partee 1977; Smith 1978, *inter alia*). However, animacy and control can only explain the alternations (1a)/(1b) and (2a)/(2b). Furthermore, the subject must be able to select, begin, and end the activity that is being described. The control must originate from within the subject and the subject herself carries the intention to behave a certain way (Brennenstuhl 1976; Davis 2011; Kaufmann 2017; Smith 1978). By including these conditions, we are able to secure the examples (1c) and (1d). Being quiet is possible, if hard, for children, but try as they might, they cannot control being asleep.

Unfortunately, we are not out of the woods yet. It is unclear where these restrictions are encoded or at what processing stage they get checked. For example, Stump (1985) considers agency and animacy as conventionally implicated rather than a lexicalized feature of his active *be*. Furthermore, the river examples (2c) and (2d) remain defiant. Based on the conditions outlined above, these sentences should be ungrammatical.

One starting point for considering agency is the thematic role of an agent, arguably the most prominent thematic role (Davis 2011). Dowty (1991) assumes five features of a prototypical agent, listed in (93). These properties can be summarized as *volition*, *sentience*, *causation*, *movement*, and *independence*.

(93) Contributing properties for the Agent Proto-Role:
  a. volitional involvement in the event or state
  b. sentience (and/or perception)
  c. causing an event or change of state in another participant
  d. movement (relative to the position of another participant)
  e. independent existence from the event named by the verb

Sophia meets these requirements for *friendly* and *noisy* in (1b). She is a living and conscious individual (93e)/(93b) who can act voluntarily (93a)/(93d), and her actions affect others (93c). On the other hand, being *intelligent* is not something she can influence, nor does it necessarily trigger a change of state in anyone else. Similarly, being *retired* is hard to change at the drop of a hat. Both of these examples are ungrammatical in (1b), despite fulfilling the conditions (93a), (93b), and (93e).

Evidently, not all of the properties in (93) are required for agency. Crucially, volition, sentience, and movement can all be bypassed, despite being the cornerstone of an agentive subject. The children in (1d) cannot switch between sleep and wakefulness at will. Thus, *being asleep* is ungrammatical, as predicted. In the case of *being quiet*, the sentence is grammatical although the children are intentionally refraining from action rather than causing changes or movement.

The sentences in (2) are another problematic case. Outside of mythical and metaphorical contexts, the river is inanimate. In the non-agentive example (2a), the river is compatible with *noisy* and *dirty*, but the combination with *friendly* leads to ungrammaticality. In the agentive examples (2b), all three predicates are ungrammatical. It appears that volition and sentience are core requirements that are not met and cause the sentence to fail.

Nevertheless, extenuating circumstances can be found which can persuade a river to take action. The contextual information within a sentence (2c) or a fairy tale scenario (2d) improves the grammaticality of *noisy* and *friendly*, respectively. In the former case, the cause of noisiness is external to the river, which remains insentient and without volition, even though there is no other agent bearing these properties (except Mother Nature). In the latter, the friendliness is triggered externally, but is understood as the underlying sentiment. The river had been hexed into mindless submission but has now returned to its senses and is voluntarily behaving friendly. The cause for the attitude change may be external, but the friendliness is internal.

The examples in (73) from Chapter 3 repeated below further illustrate this point.[1] In all of them, the subject has the thematic role of an agent. Julian in (73a) is not aware of his rudeness, and therefore can neither control nor stop being rude, although his actions are volitional. The birds in (73c) are sentient, but are acting instinctively rather than with deliberation and lack the self-reflection to control their behavior. Finally, the teething baby in (73d) is fussing due to discomfort rather than malice.

Inanimate and non-human agents are also permissible, for example *the key* and *an e-mail* in (94). The key and the e-mail themselves lack sentience and free-will. Despite this, the sentences are grammatical, because there is an external, unnamed entity fulfilling the remaining agency requirements. Finally, *a lack of involvement* explicitly negates the existence of an agent. Dowty (1979) discusses similar cases to (2)/(73)/(94) and admits inanimate subjects as agents if the actions have empirically perceivable consequences.

(73) a. Julian was unintentionally impolite to the queen, because he is unfamiliar with the diplomatic protocol.
c. The birds are being very noisy this morning.
d. The baby is being difficult this evening; I think she is teething.

(94) a. The key opened the door.
b. An e-mail announced the workshop.
c. A lack of involvement caused the progress to stagnate.

[1]Example (73b) is omitted here because it is identical to (2c).

In sum, the requirements imposed on the subject of an agentive copular sentence involve some combination of (internal or external) control, animacy, and change of state. Unfortunately, a great deal of uncertainty remains. In order to avoid unexpected pitfalls originating from the subject, we dutifully return to Sophia and leave aside other subject types. Instead, we turn to the events which lead to the state she is in now.

4.2 States and Events

Despite discussing Sophia's passive and active friendliness in great detail, one aspect has thus far been mentioned only in passing, namely what kind of "things" do *be friendly* and *being friendly* represent. The former is typically assumed to express a state, whereas the latter is considered an event. But what does this mean?

One of the earliest discussions on states and events comes from Davidson (1967). He proposed that some verbs have in their lexical entry an additional argument which makes them unique in space and time. In other words, such verbs are descriptions of an event. This change had far-reaching consequences for the study of tense and aspect.

To illustrate this point, consider the difference between the alternations of the phrase *The cat purred* in (95). In standard predicate logic (95a), the verb simply predicates over the subject. However, in Davidsonian event semantics (95b) there is a special hidden event variable e, which is absent from (95a). In addition to predication, (95b) expresses the existence of an event which is linked with the cat via purring.

One advantage of assuming an event argument is demonstrated in (96) *The cat purred softly on the bed*, which both entails and is more complex than (95). In order to express (96) in predicate logic, *softly* and *on the bed* must be added to the predicate's list of arguments, as in (96a). In the Davidsonian event semantics variant (96b), the adverb and the eventuality's location are linked with the predicate through the event variable e, which is existentially bound. The sentence in (96) can be extended further by adding e.g. *with joy*, *while I'm working*, etc. Davidsonian event semantics need only join the arguments with the conjunction $\wedge$. Predicate logic must commit to an infinite number of arguments in order to account for limitless extensions. Moreover, it must justify which arguments are necessary and which are optional, otherwise it is unclear why (95) and (96) are grammatical, but *Purred on the bed* is not.

Davidson's event argument theory was developed further by e.g. Higginbotham (1985, 2000) and Parsons (1990, 2000). Neo-Davidsonian approaches generally assume that all verbs have an event argument and that this is in fact the verb's only argument. From a neo-Davidsonian perspective, the sentence (96) can be translated as (97), which now also includes the argument's Θ-roles.

(95) The cat purred.

a. $\textsc{purr}(\textsc{cat})$

b. $\exists e[\textsc{purr}(e, \textsc{cat})]$

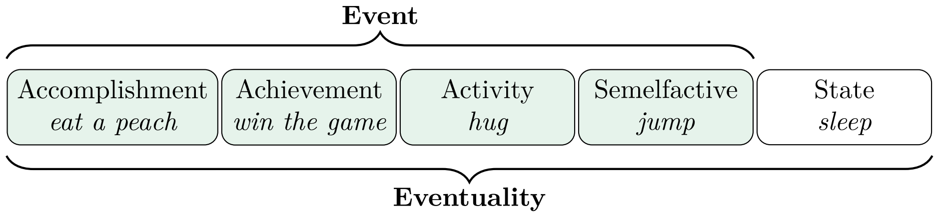


Figure 4.1: A simplified and by no means uncontested ontology of eventualities. For alternatives see e.g. Dölling (2014), Metzger et al. (2019), Mourelatos (1978), Oberle et al. (2007), Pulman (1997), and Pustejovsky (1991).

(96) The cat purred softly on the bed.
   a. $\textsc{purr}(\textsc{cat}, \textsc{softly}, \textsc{on the bed})$
   b. $\exists e[\textsc{purr}(e, \textsc{cat}) \wedge \textsc{softly}(e) \wedge \textsc{on}(e, \textsc{the bed})]$

(97) $\exists e[\textsc{purr}(e) \wedge \textsc{subj}(e, \textsc{the cat}) \wedge \textsc{softly}(e) \wedge \textsc{loc}(e, \textsc{on the bed}) \wedge \textsc{hold}(e, t)]$

If all verbs have an event variable, does this mean that all verbs are events? There is much dispute on what to call the denotations of verbs: events, eventualities, situations, episodes, happenings, or occurrences, among others. I will adopt the classification in Figure 4.1 and use the term *event* in the narrow sense, reserving *eventuality* for the superset of events and states. Nevertheless, this distinction still does not answer the question of what is a state and what is an event.

4.2.1 Aspectual Classes

Verbs vary in structure despite their similarities. For example, *sitting*, *knowing*, *sneezing*, or *being friendly* are vastly different. In order to systematically describe the diversity of verbal structures, Vendler (1957) created an ontological division of predicates into four aspectual classes,[2] also referred to as situational classes or *Aktionsarten*: states, activities, accomplishments, and achievements. The first of these – *nomen est omen* – constitute states, whereas the latter three are part of the events group (see Figure 4.1). Since Vendler there has been a large body of research into lexical aspect, how eventuality is structured and what its structural properties are. Many key elements and relevant dimensions (e.g. temporal extent, endpoints, agentivity, causality) are still a matter of debate. Nonetheless, Vendler's original *Aktionsarten* have established themselves firmly in the classification of predicates.

States (e.g. *love*, *sleep*, *sit*, *be sick*) denote ongoing eventualities. They are non-dynamic, unchanging, and do not progress. Activities (e.g. *walk*, *speak*, *play*, *hug*) denote processes. They are dynamic, ongoing, and open-ended. Accomplishments (e.g. *read a book*, *eat a peach*, *kill Bill*, *paint a picture*) are changes of state. They extend in time and, in contrast to states and activities,

[2]Vendler's classification relates to lexical aspect, in contrast to grammatical or viewpoint aspect (e.g. the progressive, habitual, perfective), which is somewhat orthogonal to lexical aspect and not at issue here.

have a natural endpoint. Loving and speaking can go unchanged on for (at least what it feels like) forever, but eating a peach ends when only the peach pit remains. Achievements (e.g. *reach the summit*, *arrive in Tübingen*, *find the typo*, *win the game*) are also changes of state, but, unlike accomplishments, they are punctual and (near) instantaneous and have no temporal duration.

Another aspectual class, *semelfactives*, is a later addition to the events category (Comrie 1976; Smith 1991). Semelfactives (e.g. singular occurrences of *jump*, *knock*, *cough*, *flash*) are events which have a simultaneous start and endpoint, and therefore do not involve a change of state. The status of semelfactives is contested due to the overlap between their start and endpoints. Smith (1991) considers them the simplest *Aktionsart*, but e.g. Rothstein (2004) regards them as a special use of activities, rather than a separate aspectual class. Furthermore, there is some debate around the properties of semelfactives. Some view them as telic (Mourelatos 1978; Rothstein 2004), while others take them as the prime example of an atelic event (Comrie 1976; Smith 1991).

Based on Vendler's original distinction, Dowty (1979) formulated a semantic analysis of the verbs' aspectual classes, which was briefly introduced in Chapter 3. He proposed a series of tests to determine which aspectual class a verb falls into based on their performance. The tests, which probe the verbs' interactions with tense and temporal modifiers, are summarized in Table 4.1. The category of semelfactives is added to Dowty's original set, following Bott (2010). Much as in the case of stage-level and individual-level predicates, there are exceptions to these tests and cases where it is unclear whether the test applies at all or what the results are; see e.g. the discussion in Dowty (1979) and Rothstein (2004).

Without going into detail let us briefly examine whether the assumptions that the sentences *Sophia is friendly/intelligent* are states and *Sophia is being friendly/*intelligent* are activities hold true. A word of caution is in order: recall that Dowty (1979) considered individual-level predicates such as *be intelligent* to be states and stage-level predicates such as *be friendly* to be activities. This is somewhat of a roadblock which prevents the tests from unfolding their true potential.

Three criteria are used by Dowty to differentiate between states and activities 1. grammaticality in non-stative constructions, 2. the acceptability of a habitual interpretation, and 11. the acceptability with adverbs such as *carefully*. Sophia's friendliness and intelligence are subjected to these tests in (98)–(104). Non-stative tests are a group of tests which probe the sentence in environments hostile to states (Lakoff 1966), e.g. the progressive and the imperative, as well as other contexts which are unsuitable for comparing between Sophia's active and stative friendliness. Two such tests are presented in (98). The second test, the availability of a habitual interpretation was part of the discussion on the SLP–ILP dichotomy in Chapter 2 and proved to be an insufficient criterion for distinguishing between friendliness and intelligence, active or passive. Thus, unfortunately, tests 1. and 2. are inadequate for investigating Sophia's character and behavior. Furthermore, *being friendly* in (104) fails test 11., which contradicts Dowty's predictions.

Criterion		State	Activity	Accom	Achiev	Semel
1	meets non-stative tests	✗	✓	✓	(✓)	(✓)
2	has habitual interpretation in simple present tense	✗	✓	✓	✓	✓
3	*ϕ for an hour*, *spend an hour ϕing*	✓	✓	✓	✗	✓
4	*ϕ in an hour*, *take an hour to ϕ*	✗	✗	✓	✓	✗
5	*ϕ for an hour* entails *ϕ at all times in the hour*	✓	✓	✗	—	✗
6	*x is ϕing* entails *x has ϕed*	—	✓	✗	—	—
7	complement of *stop*	✓	✓	✓	✗	✓
8	complement of *finish*	✗	✗	✓	✗	✗
9	ambiguity with *almost*	✗	✗	✓	✗	
10	*x ϕed in an hour* entails *x was ϕing during that hour*	—	—	✓	✗	—
11	occurs with *studiously*, *attentively*, *carefully*, *obediently* etc.	✗	✓	✓	✗	✗

Table 4.1: Tests for the aspectual classification of verbs adapted from Bott (2010) and Dowty (1979). ϕ = a VP, e.g. *win the game*; ✓= the sentence is grammatical, semantically normal or fulfills the criterion; (✓) = the sentence fulfills the criterion if agentive; ✗= the sentence is ungrammatical, semantically anomalous or does not fulfill the criterion; — = the test does not apply to verbs of this class; Accom = accomplishment; Achiev = achievement; Semel = semelfactive.

Surprisingly, *be intelligent* fails tests 3. and 5. in (99), despite the fact that both a state and an activity interpretation should be available. Both predicate constructions are ungrammatical in (100)/(102)/(103) and at least somewhat acceptable in (101) in accordance with the expectations of tests 4., 8., 9., and 7., respectively.

(98) a. Sophia is (being) (*)hungry/friendly/(*)intelligent. test 1
b. Be/*Being *hungry/friendly/*intelligent!

(99) a. Sophia was hungry/?friendly/*intelligent for an hour. tests 3 and 5
b. Sophia was being *hungry/friendly/*intelligent for an hour.

(100) a. *Sophia was hungry/friendly/intelligent in an hour. test 4
b. *Sophia was being hungry/friendly/intelligent in an hour.

(101) Sophia stopped being hungry/friendly/??intelligent. test 7

(102) *Sophia finished being hungry/friendly/intelligent. test 8

(103) a. *Sophia is almost hungry/friendly/intelligent. test 9
b. *Sophia is being almost hungry/friendly/intelligent.

(104) a. *Sophia is carefully/obediently hungry/friendly/intelligent. test 11
b. *Sophia is being carefully/obediently hungry/friendly/intelligent.

Although Dowty's tests fare well with verbs such as *sleep* and *play*, they do not contribute to answering the question whether *Sophia is friendly* is a state and *Sophia is being friendly* an activity. An alternative avenue worth

	Rothstein (2004)		Smith (1991)		
	[±*stages*]	[±*telic*]	[±*static*]	[±*durative*]	[±*telic*]
States	−	−	+	+	−
Activities	+	−	−	+	−
Achievements	−	+	−	−	+
Accomplishments	+	+	−	+	+
Semelfactive	n/a	n/a	−	−	−

Table 4.2: Aspectual classes and their features according to Rothstein (2004) and Smith (1991). n/a = absent from aspectual system.

exploring is framing the Vendlerian distinction based on binary features (e.g. Jackendoff 1991; Rothstein 2004; Smith 1991; de Swart 1998).

One such distinction was proposed by Rothstein, whose classification is presented in Table 4.2 (Rothstein 2004, p. 192). According to Rothstein, two features are central to separating verbs into classes: the presence of discernible stages and telicity. The feature [±*stages*] relates to whether the eventualities are minimal [−*stages*] or extended [+*stages*] (Landman 1992). States and achievements are non-dynamic eventualities that carry the [−*stages*] feature. The former are homogeneous and the latter are punctual events with neither a temporal dimension nor an internal structure. For example, *knowing* a fact (state) is true for even the smallest time interval, and *winning a game* (achievement) happens in the blink of an eye. Activities and accomplishments carry the [+*stages*] feature, because they are dynamic and extend in time. Moreover, they have a complex internal structure in that they are conceptually divisible into some minimal stages. The activity *walking* can be decomposed into singular steps, and the accomplishment of *eating a peach* consists of biting, chewing, swallowing etc.

The value of [±*stages*] is determined by probing the eventuality's compatibility with the progressive. States and achievements are typically ungrammatical in the progressive (e.g. **knowing the answer*, ?*winning the game*), whereas activities and accomplishments are grammatical in the progressive (e.g. *walking*, *eating a peach*).

The [±*telic*] feature relates to whether the verbs denote events that change [+*telic*] or unchanging eventualities [−*telic*]. Achievements and accomplishments are [+*telic*], because they have an event-related endpoint (also called a culmination or set terminal point), for example the trophy in *win the game* or the peach pit in *eat a peach.* States and activities — once they have started — can continue indefinitely, which is why they are atelic or [−*telic*]. Both *loving* and *running* can go on until the agent is depleted of energy, but a *perpetuum mobile* and everlasting love are conceptually possible. Rothstein probes a verb's telicity by whether it can naturally head telic VPs, which in turn can be diagnosed through their incompatibility with durative adverbials such as *for days/hours* or Dowty's test 3. in Table 4.1.

Returning to Sophia's friendliness, Rothstein (2004) argues that it is atelic but the value for [±*stages*] varies depending on the interpretation. If Sophia is actively friendly, her behavior has stages, and thus the [+*stages*] feature, while in the default case her friendliness is stative and receives the [−*stages*]

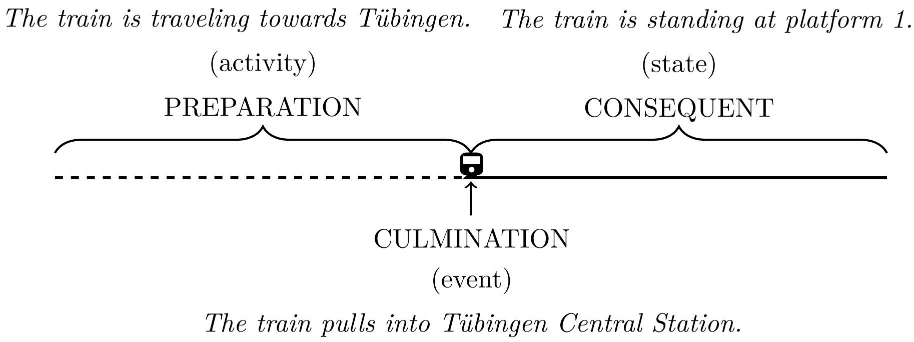


Figure 4.2: Nucleus event structure.

feature. Rothstein gives a clear answer to our initial question: *Sophia is friendly* is a state by default and an activity by necessity, whereas *Sophia is being friendly* is an activity (see also Chapter 3).

Smith (1991, 1999) proposed a different classification, as presented in the second half of Table 4.2 (Smith 1991, p. 20), and, unlike Rothstein (2004), she includes the category of semelfactives. According to Smith, three features are defining in distinguishing between aspectual classes: dynamism, duration, and telicity.

The feature [±*static*] refers to the fundamental distinction between motion and stasis, and is used to single out states [+*static*] from other aspectual classes [−*static*], which are dynamic and (directly) involve agents. Smith argues that Sophia lacks the dynamism required for action in *Sophia is friendly*, making this sentence a state. The progressive aspect of *Sophia is being friendly* endows the state with dynamism, shifting the interpretation to a habitual state, but a state nonetheless.

The feature [±*durative*] refers to the difference between instantaneous and durative situations. Both achievements and semelfactives fall into the category of punctual events [−*durative*] in an idealized sense, although they necessarily last at least a millisecond. By contrast, the remaining aspectual classes extend in time between an initial and a final endpoint [+*durative*]. Lastly, the familiar feature [±*telic*] relates to whether the event is an atelic process with an arbitrary endpoint [−*telic*] or involves a change of state consisting of an outcome or goal of the event with a set final endpoint [+*telic*]. This feature does not apply to states.

In contrast to feature-based approaches, van Lambalgen and Hamm (2005), Moens and Steedman (1988), and Pulman (1997) view the event nucleus as the root of the aspectual distinctions. The event nucleus, pictured in Figure 4.2, is a complex structure consisting of a culmination, an associated preparatory process, and a consequent state (Moens and Steedman 1988, p. 18). The event nucleus can be used to describe the different aspectual classes, because each *Aktionsart* has a unique mixture of the nucleus's elements, as depicted in Table 4.3.

Figure 4.2 illustrates three aspectual classes: the activity *traveling*, the state of *standing*, and the punctual event of *pulling into the station*. Each

	Event nucleus		
	Preparatory phase	Culmination	Consequent state
Activity	✓	—	—
Semelfactive	—	✓	—
State	—	—	✓
Achievement	—	✓	✓
Accomplishment	✓	✓	✓

Table 4.3: Aspectual classes in relation to the event nucleus. ✓= includes nucleus part, — = does not include nucleus part.

of these aspectual classes consists of only one element of the event nucleus, whereas achievements and accomplishments are composed of multiple elements. The achievement *The train arrived at Tübingen Central Station* consists of the culmination *the train pulled into the platform* and the consequent state of immobility. The accomplishment *The train traveled to Tübingen Central Station* consists of all three parts (the traveling activity, the culmination, and the state).

Moens and Steedman (1988) identified two dimensions of events: decomposability [±*composite*] and telicity [±*telic*] (see Figure 4.3). Decomposability or durativity relates to whether or not the event decomposes into sub-events. Activities and accomplishments are [+*composite*], because they consist of multiple sub-events (or stages) and they extend in time. Achievements and semelfactives are punctual, and therefore too short to have stages [−*composite*]. Telicity, as previously mentioned, pertains to whether or not an event is completed and has a culmination. Accomplishments and achievements have natural endpoints [+*telic*], while activities are open-ended [−*telic*]. Semelfactives are also ranked as atelic, akin to Smith (1991).

The event nucleus approach to aspect categorizes *Sophia is friendly* as a state, because it involves neither a preparatory phase nor a culmination. On the other hand, *Sophia is being friendly* must be an activity, because the progressive requires an activity as its argument (van Lambalgen and Hamm 2005; Moens and Steedman 1988; Pulman 1997; Steedman 2011).

4.2.2 Interim Summary

So far this chapter has addressed the role of the subject in agentive copular clauses and outlined the benefits of a (neo-)Davidsonian event semantics. Subsequently, it discussed the ontological distinction between events and states, as well as various ways in which verbs are divided into aspectual classes. Based on its lexical aspectual properties, *Sophia is being friendly* is categorized as an activity. By contrast, *Sophia is friendly* is typically, although not necessarily, a state.

The last unaddressed issue is the exact path to the activity and state interpretations of Sophia's friendliness. The Coercion Account proposes a stative copula, which can receive an event interpretation through coercion. The Underspecification Account proposes an underspecified copula, which acquires aspectual flavor through specification. The remaining part of this chapter explores the mechanisms of meaning adaptation that underlie these accounts.

4.3 Coercion

The term *coercion* was adopted from computer science by Moens and Steedman (1988) to describe "[t]he phenomenon of change in the aspectual type of a proposition under the influence of modifiers like tenses, temporal adverbials, and aspectual auxiliaries" (p. 17). It is a mechanism for conflict avoidance.

Coercion describes the resolution of a combinatorial conflict which arises during sentence processing under particular semantic or syntactic conditions (Asher 2011; Fernald 1999; Jackendoff 1997; Moens and Steedman 1988; Pustejovsky 2001; de Swart 2011). The cooperative listener is faced with a defective utterance from an equally cooperative but succinct speaker (Grice 1975). The listener must then accommodate or fill in information in order to arrive at an acceptable interpretation. Crucially, coercion always affects the argument and not the functor, but it is unclear whether it is a semantic or pragmatic phenomenon (Jackendoff 1997; Maienborn 2003b; Pustejovsky 2001; de Swart 2011). In order to resolve the conflict, the listener relies on the utterance's context, the common ground, and their world knowledge. Therefore, the expression resulting from coercion has more material in it than just the content of the words.

To illustrate this phenomenon, consider the sentences in (105)–(106), which exemplify two kinds of coercion: complement coercion and aspectual coercion. In the case of complement coercion (105), the complement does not fulfill the verb's selectional restrictions and must be reinterpreted into a fitting argument. The verb *enjoy* in (105) expects a process as its complement. Instead, the combination with the noun *book*, *coffee*, or *race* causes a mismatch, which is resolved by interpreting an action frequently associated with the noun. The interpolated action is different for each sentence. Thus, (105a) is typically interpreted as *Julian enjoyed reading/writing the book*, although he is at an age where paging through a book, listening to it being read, and chewing the cover are equally probable. Similarly, the activity in (105b) is likely to be drinking, and finally in (105c) Aleks is taking pleasure is watching or participating in the race.

(105) Complement coercion

a. Julian enjoyed the book. → reading

b. Sophia enjoyed the coffee. → drinking

c. Aleks enjoyed the race. → watching

(106) Aspectual coercion

a. Emilia jumped for an hour. → repeatedly

b. The pilot finished landing the plane. → descent, landing, taxi

c. Bran scaled the difficult mountain. → difficult to climb

Aspectual coercion can occur when the verb's event structure does not fulfill the restrictions of the context, as in (106). Here, the entire situation must be reinterpreted into a different type. Jumping is a punctual event. The combination with a durative temporal adverbial *for an hour* in (106a) forces the reader to reassess their interpretation. A single jump generally cannot stretch over an hour, unless Emilia is space diving. Therefore, the interpreter may choose to coerce the culminating event into its iteration: Emilia jumps repeatedly within a one-hour window. Similarly, landing is the instant when a plane touches the ground. However, the combination with *finished* in (106b) requires the reinterpretation of the punctual event to include the entire process of the descent, landing, and maybe even taxiing. In the final example (106c), the mountain is not difficult *per se*, and hence some activity related to it must be found, such as climbing or skiing.

The phenomenon of coercion has long been a subject of discussion among theoretical and experimental linguists. Complement coercion and aspectual coercion are two mechanisms of reinterpretation that have been widely adopted, although some researchers argue for the existence of other reinterpretation types, e.g. landing site coercion (Egg 2005). Despite its ubiquitousness, coercion is elusive and hard to pin down in both theoretical and empirical investigations. Moreover, most of the neuro- and psycholinguistic studies focus only on some of its aspects, predominantly complement coercion and iterative coercion. The following sections present a handful of approaches to complement and aspectual coercion, before focusing on its agentive form.

4.3.1 Complement Coercion and the Generative Lexicon

Pustejovsky (1991, 1993, 2001, 2017) developed a lexico-semantic front of coercion. He defines coercion as “a semantic operation that converts an argument to the type which is expected by a function, where it would otherwise result in a type error” (Pustejovsky 2001, p. 59). Pustejovsky positions himself in contrast to “static approaches”, where every word has a fixed lexical meaning and where changes in interpretation are explained through homonymy, type raising or type-shifting operations (see, for example, multiple *be* approaches and shifting operators in Chapter 3). He views these methods as in some sense precursors to coercion.

Pustejovsky’s Generative Lexicon is dynamic. Every word is somewhat ambiguous and its meaning can flow from one context to another. This flexibility “spreads the semantic load” in the lexicon between different word classes and explains how speakers can be so creative with words and their meanings. The fluctuation of meaning can spread beyond semantics and pragmatics.

The Generative Lexicon is characterized by four levels of semantic representations: *argument structure* (the number and type of arguments, and their syntactic realization), *event structure* (the event type of lexical items and phrases: state, activity, etc.), *qualia structure* (the essential aspects of the word’s meaning), and *lexical inheritance structure* (the relation of one lexical structure to other structures in the lexicon). These four levels are connected by the generative semantic transformations of *type coercion* (where a word or phrase is coerced to fit a type required by a governing word or phrase without affecting the former’s syntactic structure), *selective binding* (where the aspect of a lexical item is bound to an aspect of another lexical item's meaning), and *co-composition* (where the interaction of several elements of a phrase leads to generating new non-lexicalized meanings of a word). Of these three, only coercion will be of any importance here.

Example (107) illustrates the lexical entry of the noun *book* and the Generative Lexicon in action. The lexical entry in (107) can be paraphrased as (108) in predicate logic, where a refers to the author, r to the reader, *phys* to physical object, and *info* to informational object. The first part of (107) specifies the argument structure, which in the case of a book can take one of two forms. The *book* can refer to the abstract information content ($\textsc{arg}_1$), as is meant in the sentence *The book is captivating*, or the physical object ($\textsc{arg}_2$) made of paper, as in *The book is on the shelf.*

The qualia structure specifies the book's essence through the different types of predication of which the book can be a part. In other words, the various roles a book plays in a person's life. Since *book* can be both a physical ($\textsc{arg}_2 = y$) and an informational object ($\textsc{arg}_1 = x$), these two meanings are combined via $\cdot$ to a dot type object. Pustejovsky refers to the lexical item's ability to contain these various senses. The expression $x \cdot y$ conveys that a book can be a physical object and an informational object.

Books have at least three inherent properties, which are captured by the various qualia. The FORMAL quale pertains to how the different meanings of a polymorphic type such as *book* relate to one another (what is a book). In this case, a book is conceptually like a container in that it is filled with knowledge (or lies). This containment relation is expressed by *holding*: the physical object contains the information. The TELIC quale specifies the purpose or function of the book, which is typically being read by someone (unless it is a picture book). Lastly, the AGENTIVE quale expresses how a book comes into existence, i.e. by being written and illustrated by someone.

If instead of *book* we were dealing with *novel*, the FORMAL quale would be $book(x)$, because a novel is a type of book. An additional CONSTITUTIVE quale would be included in order to expresses the relation between the object and its parts, i.e. what is it made of. In the case of *novel*, this could be something along the lines of $narrative(x)$.

(107)
$$\begin{bmatrix} \textbf{book} & & \\ \begin{array}{l}\textsc{argument}\\\textsc{structure}\end{array} & = & \begin{bmatrix} \textsc{arg}_1 & = x\text{:}\textit{informational object} \\ \textsc{arg}_2 & = y\text{:}\textit{physical object} \end{bmatrix} \\ \textsc{qualia} & = & \begin{bmatrix} \mathbf{x \cdot y} & \\ \textsc{formal} & = hold(y, x) \\ \textsc{telic} & = read(e_1, reader, x \cdot y) \\ \textsc{agentive} & = write(e_2, author, x \cdot y) \end{bmatrix} \end{bmatrix}$$

(108) $\lambda x \cdot y\ \exists e_2 \exists a[\textsc{book}(x\text{:}\textit{info} \cdot y\text{:}\textit{phys}) : hold(y, x) \wedge [\textsc{write}(e_2, a, x \cdot y)]] \wedge \lambda r \lambda e_1[\textsc{read}(e_1, r, x \cdot y)]$

In order to explain the examples in (105), Pustejovsky (1991) argues that the events which need to be interpolated are reconstructed based on the qualia structures. Thus, reading and writing are obvious candidates for an event associated with a book.

Pustejovsky's Generative Lexicon is advantageous to describing complement coercion, although it has been criticized for over- and under-generating interpretations (Asher 2011; Bott 2010; Bücking and Maienborn 2019; Dölling 2020; Egg 2005). However, Sophia's friendly disposition, whether fleeting or permanent, is not an instance of complement but of aspectual coercion.

4.3.2 The Aspectual Transition Network

In order to systematically organize the diversity of aspectual coercion, Moens and Steedman (1988) proposed a network of possible transitions between the aspectual classes. Figure 4.3 presents the aspectual transition network adapted from Moens and Steedman (1988) and Steedman (2011) with one minor modification. The original POINT class is replaced by SEMELFACTIVE, in keeping with this chapter's ontology (Figure 4.1).

The transition network explains how shifts between *Aktionsarten* take place and what their results are. The changes in an event's aspectual type due to coercion have different effects on its interpretation. One famous example of a sentence embodying all the admissible coercions is *It took me two days to play the "Minute Waltz" in less than sixty seconds for more than an hour*, which takes you on a journey through the entire network. Since this sentence is well discussed in the literature (Bott 2010; Egg 2005; Moens and Steedman 1988; Pulman 1997; Steedman 2011, among others), I illustrate all the admissible changes according to the transition network on other examples in (109)–(111) below.

Sentence (109) is a prototypical achievement. The transition network allows only two reinterpretation paths from an achievement: (i) to a state, if it is put in the perfect grammatical aspect, as it is the case in (109a); and (ii) to an accomplishment if there is some activity that can be interpolated. In the latter case, the utterance can either remain an accomplishment (the summit reaching stretches in time) or travel further via iteration into a semelfactive (multiple repeated ascents), as in the case of example (109b). Alternatively, it can continue to a progressive state interpretation (109c). This shift, however, cannot be performed directly, as there is no line linking accomplishments and states. Therefore, the interpretation must first be coerced to an activity, before advancing to the progressive state one.

The semelfactive class (110) is the gateway to various other *Aktionsarten*. It can be iterated to an activity of repeated jumping (110a) or to a habit of bouncing (110b). Given the fact that Emilia is a hyper-energetic cat, both of these interpretations are exceedingly easy to derive. The semelfactive can also be coerced to an achievement (110c) by adding a consequent state of having jumpingly arrived at home.

Activities such as (111) are a large transit hub. The addition of the progressive aspect shifts the activity to a progressive state of floating (111a), whereas the addition of a one-mile goal changes it into an accomplishment (111b). From (111b) the sentence can return to being an activity (111c) by removing the culmination and adding the progressive. Note that there is no

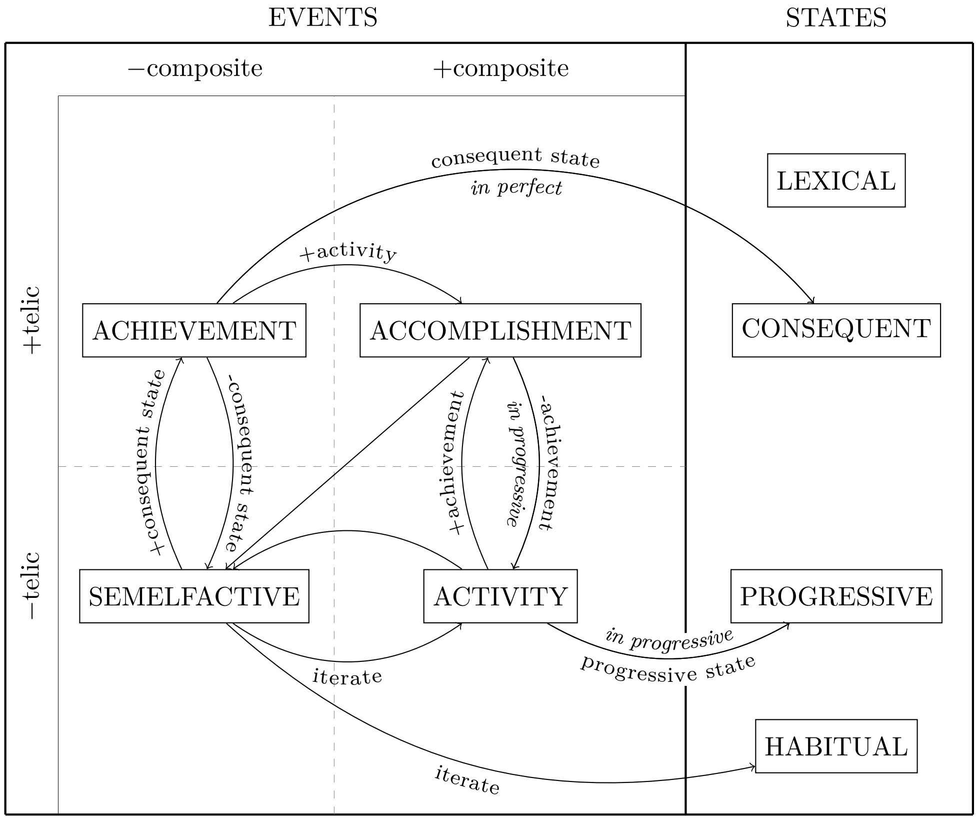


Figure 4.3: Aspectual transition network adapted from Moens and Steedman (1988) and Steedman (2011). The POINT category is replaced by SEMELFACTIVE. Arrows indicate possible type-transitions. Italics mark restrictions under what influence can the transition happen.

connection from the progressive state (111a) back to an activity interpretation, so the interpreter must travel through the accomplishment stage. A different loop back to an activity interpretation is (111d), where the situation is first coerced from an accomplishment (111b) to a point by stripping away the goal and the duration, and lastly by iterating it to an activity of swimming back and forth.

(109) Aleks reached the summit. — achievement
   a. #Aleks has reached the summit — → consequent state
   b. #Aleks reached the summit for an hour. — → accomplishment or semelfactive
   c. #Aleks was (just) reaching the summit. — → accomplishment → activity → progressive state

(110) Emilia jumped. — semelfactive
   a. #Emilia was jumping. — → iterated activity
   b. #Emilia jumped every day. — → habitual state
   c. #Emilia took an hour to jump home. — → achievement

(111) Bogdan swam. — activity
   a. #Bogdan was swimming. — → progressive state
   b. #Bogdan swam a mile. — → accomplishment
   c. #Bogdan was swimming a mile. — → accomplishment → activity
   d. #Bogdan was swimming a mile for two hours. — → accomplishment → semelfactive → activity

The aspectual transition network is a convenient way of not only modeling the possible coercion types, but also specifying the processes that guide the coercions (e.g. the progressive, a goal, iteration). However, the careful reader will have noticed a conspicuous absence of Sophia. The transition network of Moens and Steedman (1988) does not support the agentive alternations in (1)–(2), because there is no path that leads from a state to an activity. All roads leading to states are dead ends.

Agentive Coercion

Agentive coercion is a type of aspectual coercion that takes place when there is a sortal mismatch between the functor which expects a state and the event arguments with which it is supplied. As a result, the stative situation is reinterpreted as an event. The Coercion Account argues that the differences in meaning between *Sophia is friendly* and *Sophia is being friendly* in (1) and its agentive connotations are due to such a reinterpretation.

Agentive coercion is what Fernald (1999, 2000) calls *evidential coercion*, because "it involves the subject giving behavioral evidence for having the property named by the ILP" (Fernald 2000, p. 66). According to Fernald, evidential coercion takes an individual-level predicate as input and returns a stage-level predicate as output. The subject's actions are consistent with the properties of the individual-level predicate. The progressive aspect is an environment where this type of coercion is more likely to succeed. Nevertheless, a successful interpretation is contingent on the particular property, the stereotypical behavior associated with it, and the broad context.

One approach to agentive coercion was presented in the previous chapter. Maienborn (2001, 2003a,b, 2004, 2005, 2019) proposed a coercion template for the progressive in (91) repeated below.

(91) Coercion template for the progressive:
$\lambda s \ldots \exists s[P(s)](e) \rightarrow \lambda e_{act} \ldots \exists s[P(s) \ \& \ R(s, e_{act})]$

Maienborn's coercion template resolves the type conflict between the stative copular clause and the progressive by interpolating a relation which links the state to an activity. For details on her analysis and an example computation, see Chapter 3.

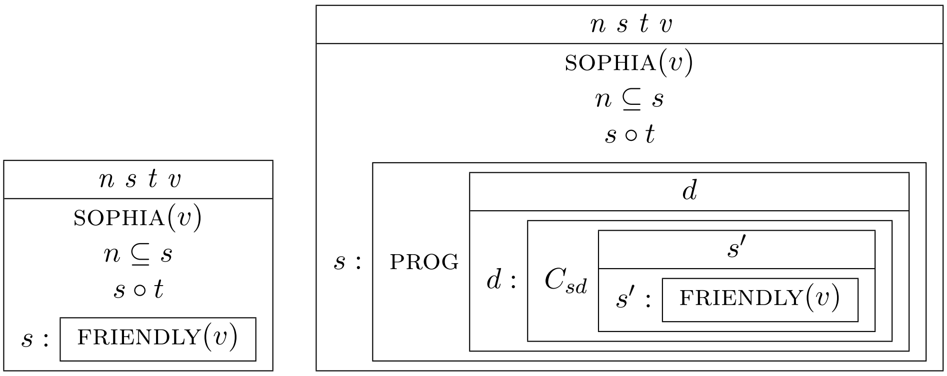
De Swart (1998, 2011) proposes an approach which is similar to Maienborn (2003a) in that both regard agentive coercion as a repair of a defective phrase which shifts the state to a different eventuality before it can combine with the progressive. However, de Swart solves coercion through operators in Discourse Representation Theory. For agentive coercion, she proposes an operator which, under the influence of the progressive and other contextual factors, shifts the non-dynamic state *be friendly* to a dynamic state of *being friendly*.

De Swart adopts the classical view of DRT (Kamp and Reyle 1993) for the stative interpretation of Sophia's friendliness, as illustrated in Figure 4.4a.[3] Here, Sophia is related to the state s of friendliness through the discourse referent variable v. The sentence is uttered in present tense, therefore the friendliness is concurrent to the utterance time ($n \subseteq s$). The friendliness state temporally overlaps with the location time ($s \circ t$), i.e. with the period denoted by the sentence's grammatical aspect.

The active counterpart *Sophia is being friendly* is much more complex. Sophia, the present tense and situation time are the same as in Figure 4.4a, but that is where the similarities end. Not only does the DRS in Figure 4.4b need to accommodate the progressive aspect via PROG, but the stative predicate must be reinterpreted to a dynamic situation. The interpretation is cushioned through the hidden coercion operator C_{sd} which "reinterprets the state description as a dynamic description, which has the aspectual features that allow it to be an argument of the Progressive operator" (de Swart 2011, p. 584). When the interpreter is forced to reinterpret an event, the coercion operator is automatically inserted into the space reserved for the grammatical aspect in the representation structure and maps a stative eventuality onto an active one, resolving the mismatch.

The subscript of the operator C_{sd} relates to the fact that it takes a state s and returns a dynamic situation d. In Figure 4.4b, the dynamic situation d (in this case, an activity) is the result of an agentive coercion of the state s' and the input for the progressive operator PROG. The output of the progressive operator is a state, but "the state of an event or process being in progress

[3] For a brief introduction to Discourse Representation Theory, see Appendix A.



(a) *Sophia is friendly.* (b) *Sophia is being friendly.*

Figure 4.4: Discourse representation structures for the composition and coercion adapted from de Swart (1998). The variables: C_{sd} = coercion operator, d = dynamic eventuality, n = utterance time, s, s' = state, t = location time, v = discourse referent, $\subseteq$ = the subset relation and $\circ$ = overlapping relation, both used here for temporal ordering of situations.

is more dynamic than the underlying lexical state" (de Swart 2011, p. 584). de Swart defines C_{sd} as *Dynamic*.

Dynamic *is a function from sets of state eventualities onto sets of dynamic eventualities in such a way that the state is presented as a process or event that the agent is actively involved in.*

In sum, the approaches to aspectual coercion summarized above boil down to transforming one eventuality into another one as a result of a defect. In the case of agentive coercion, this is assumed to be a shift from a state to either an activity or a progressive state.

However, not all coercion instances need be destructive (see e.g. Asher 2011; Bücking and Maienborn 2019). In some instances, it may be enough to accommodate the misfitting word without changing much of the underlying sentence or argument structure. Consider the sentence *I'm parked in the back*. Here, it would suffice to change myself into a vehicle such as my bike or my (admittedly inexistent) car for the sentence to be completely acceptable. This shift would preserve most of the properties of the subject, while satisfying the verb's expectations.

If destructive coercion is responsible for the agentive implications in (1), then the eventuality resulting from the reinterpretation should be transformed from a state to an activity. An earlier part of this chapter discussed the tests for the aspectual classification of verbs proposed by Dowty (1979) and they proved to be largely unsuited for comparing Sophia's deliberate and unplanned behavior. The following three tests examine whether agentive coercion triggers a complete aspectual shift to an activity or whether the agentivity effect is locally contained.

A one way of distinguishing states from events in relation to agentive coercion is described in Asher (2011). The test in (112) relies on the fact that the anaphora in *doing it* refers to some event in the first part of the sentence. The reference is impossible in (112a), because *Bran is loud* is a state. By contrast, (112b) is grammatical, because *Bran is being loud* is an activity that can be referenced by *it*. This finding indicates that agentive coercion is in fact destructive. However, anaphora can sometimes be quite flexible with respect to their antecedents, as it is evident in the predicate tests in Chapter 2.

(112) a. *Bran is loud and he's doing it to annoy you.
b. Bran is being loud and he's doing it to annoy you.

Maienborn (2003b) proposes the diagnostic in (113) to distinguish between states and activities. Note that *ein bisschen* 'a little bit' functions here exclusively as a degree modifier rather than a situation modifier. In other words, Sophia is slightly friendly but not friendly for a little while. The sentence in (113a) has both state and activity interpretations. On the other hand, the sentence in (113b) is restricted through the use of *sah ich… sein* 'I saw… be'. Perceptual reports of this kind are compatible with activities but not with states. The sentence in (113b) passes the test: the agentive interpretation is possible and the sentence is grammatical. The availability of the event interpretation indicates that the entire eventuality is shifted from a state to an activity in a destructive coercion process. This result corroborates the result of the anaphora test.

(113) a. Gestern war Sophia ein bisschen freundlich.
yesterday was Sophia a little.bit friendly
Yesterday Sophia was/was being a bit friendly.
b. Gestern sah ich Sophia ein bisschen freundlich sein.
yesterday saw I Sophia a little.bit friendly be
Yesterday I saw Sophia be/being a bit friendly.

Lastly, the coordination test from Chapter 2 can also be applied as in (114). It relies on the observations that two eventualities of the same sort can be linked with the conjunction *and* but combining different eventualities leads to markedness or ungrammaticality. Nonetheless, all the permutations in (114) seem at least acceptable. This finding suggests that agentive coercion may be non-destructive, although — as mentioned previously — this test is unreliable and highly subjective.

(114) a. Sophia is friendly and she is brave. state+state
b. Sophia is friendly and she is being brave. state+activity
c. Sophia is being friendly and she is being brave. activity+activity
d. ?Sophia is being friendly and she is brave. activity+state

Overall, the evidence indicates that agentive coercion in copular sentences is a global process that completely transforms the eventuality from a state to an activity. In addition, it attributes volitional control over the activity to the subject. However, Sophia's friendliness does not necessarily rely on coercion. It could be that it is due to underspecification as hypothesized by the Underspecification Account.

4.4 Underspecification

Underspecification is "the deliberate omission of information from linguistic descriptions to capture several alternative realizations of a linguistic phenomenon in one single representation" (Egg 2011, p. 536). In other words, it is the notion that some information is purposely missing from a representation. There are multiple possible alternatives which can fill in this gap. Therefore, this partial construction can be completed in different predictable ways, one for each ambiguity.

Although its origins lie in phonology, underspecification has proven useful in the study of ambiguity in syntax and semantics. One type of underspecification is structural underspecification, which encompasses phenomena such as scope ambiguity, ellipsis, and presupposition. The underspecification category that is pertinent to Sophia is lexical underspecification, which also includes polysemy and metonymy. However, the boundary between structural and lexical underspecification or ambiguity is not always clear.

During comprehension, underspecification is processed in two steps. Initially, a partial representation, which is missing a piece, is built. The parser continues with an incomplete construction until a disambiguation is found. The choice of disambiguation is free but influenced by the lexical context, world knowledge, plausibility, semantic complexity, and other contributing factors (Bierwisch 1982, 1983). The underspecified (and later the fully specified) representation preserves and retains all the contributions of the expression's parts, unlike coercion, where the result of reinterpretation is more than the sum of its parts.

A few examples of underspecification are provided in (115), but there is no consensus as to what the inclusion and exclusion criteria for this phenomenon are (Bierwisch 1997; Blutner 2000; Dölling 2014; Egg 2011; Frazier and Rayner 1990; Pustejovsky 2017). (115a) is a famous example of scope ambiguity with two interpretation options: either there is one person who is adored by everyone else on the planet or everyone has a unique soulmate whom they love. The underspecification in (115b) is due to an attachment ambiguity for the gun ownership. Either the actress fired her gun, killing the stalker, or the actress neutralized the stalker (e.g. by defenestration) who was threatening her with his gun.

The sentence in (115c) is ambiguous with respect to whom the personal pronoun *he* is referencing. It could be either Aleks or some other, unnamed man. Furthermore, it is open for interpretation whether the thinking or the coming are negated. (115c) could be paraphrased as "Aleks believes that it is not the case that he (whoever it may be) will come", or "it is not true that Aleks believes he will come."

The adjective *beautiful* in (115d) is ambiguous between an intersective and non-intersective interpretation (Larson 1998). The former can be paraphrased as "Olga, who is a dancer by profession, is attractive", and the latter expresses that Olga dances exquisitely or is attractive when she is dancing, but rather plain otherwise.

The verb *to rent* in (115e) in underspecified with respect to the event it describes. The student could be either a landlord or a tenant, though world knowledge and the starving student stereotype seem to bias the interpretation to the student paying rent to someone else. The final example (115f) is ambiguous due to the polysemy of *newspaper*. Depending on context, the billionaire could have purchased a printed copy of today's edition of the publication or she could have purchased the organization, fired all ethical journalists, and turned it into a tabloid in order to spread discord in the world for his own benefit.

(115) a. Everyone loves someone. — one idol or many soulmates
b. The actress killed the stalker with a gun. — gun owned by actress or stalker
c. Aleks$_a$ doesn't think he$_{a/b}$ will come. — Aleks or someone else; ¬think or ¬come
d. Olga is a beautiful dancer. — appearance or dance moves
e. The student rented the room. — the student is paying or collection rent
f. The billionaire bought the newspaper. — publication or organization

From an underspecification perspective, Sophia's passive friendliness and premeditated friendliness are semantically identical until there is reason to specify it one way or the other. There is no conflict in either a state or an activity interpretation. The agentive interpretation is just one of the alternatives, which happens to be more plausible in the progressive and less plausible in the simple aspect.

Much as in the case of coercion, there are different formal systems that try to regulate underspecification (for an overview, see e.g. Egg 2011). One underspecification theory was introduced in the previous chapter (Rothstein 1999). The remainder of this section focuses on three other theories and relates them to Sophia's friendliness (Dölling 2014; Egg 2005, 2011; Pulman 1997).

The approaches outlined below share the idea that the semantic representation of a phrase includes gaps where information can be supplemented. The gaps can be filled in either compositionally or through a coercion operator, which buffers any potential conflicts. Dölling (2014), Egg (2005), and Pulman (1997) each discuss underspecification in relation to its connection with coercion and argue for an underspecified semantics of coercion. In their view, coercion is more akin to a set of training wheels for a bike than a re-welding of the frame after an accident, unlike for the approaches outlined in the previous section.

4.4.1 Pulman (1997)

Pulman (1997) bases his approach on Moens and Steedman (1988) and offers a formalization of the aspectual transition network. In keeping with the transition network, he argues for the existence of many coercion instances, some of which even occur simultaneously. A phrase may contain as many coercions as it takes to arrive at the desired interpretation. Some coercions are easy, whereas others are costly.

According to Pulman, coercion is underspecified and the eventuality resulting from it is determined by the context and plausibility. Pulman suggests that the underspecified coercion operator is applied to a verbal phrase and returns it unchanged if there is no need for reinterpretation, or yields an appropriate shifted interpretation, e.g. through iteration or the progressive. The coercion operator is inserted between the VP and the auxiliary as in (116), where P is a predicate, e is an eventuality, and y is an individual variable. The exact coercion type is determined depending on the particular instance.

The following two examples illustrate Pulman's (somewhat simplified) underspecification calculus. In the case of Sophia being deliberately friendly, the sentence is computer as in (117), where s is a state, e is an event (in this case, an activity), P is a predicate, and x and y are individual variables. During composition, the parser notices a potential conflict between the state VP and the progressive aspect (117c) and prevents it by specifying the COERCE operator to interpret the state VP as an activity event, in accordance with the expectation of the progressive. However, Pulman admits that "[t]here is no regular way to coerce a state to a process" (Pulman 1997, p. 290). In the final step (117d), the subject is combined with the auxiliary VP to form a clause. The overall interpretation of (117) describes the event consisting of Sophia displaying the state of friendliness.

In contrast to (117), the state interpretation of *Sophia is friendly* (118) is straightforward. The coercion operator is applied to the VP and returns it unchanged (118a), before the VP composes with the subject (118b). If, despite the simple aspect, there is reason to retain the coercion operator, then it remains in the representation.

(116) $\lambda P \lambda e \lambda y[\textsc{aux}(\textsc{coerce}(P))(e, y)]$

(117) Sophia is being friendly.

a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}$

b. $[\![\text{is friendly}]\!] \equiv \lambda x \lambda s[\textsc{be-friendly}(s, x)]$

c. $[\![\text{is being friendly}]\!]_{\textsc{aux}}$
$\equiv \lambda P \lambda y \lambda e[\textsc{prog}(\textsc{coerce}(P))(e, y)](\lambda x \lambda s[\textsc{be-friendly}(s, x)])$
$\equiv \lambda y \lambda e[\textsc{prog}(\textsc{coerce}(\lambda x \lambda s[\textsc{be-friendly}(s, x)]))(e, y)]$
coercion operator is applied to VP

d. $[\![\text{Sophia is being friendly}]\!]$
$\equiv \lambda y \lambda e[\textsc{prog}(\textsc{coerce}(\lambda x \lambda s[\textsc{be-friendly}(s, x)]))(e, y)](\textsc{sophia})$
$\equiv \lambda e[\textsc{prog}(\textsc{coerce}(\lambda x \lambda s[\textsc{be-friendly}(s, x)]))(e, \textsc{sophia})]$
$\equiv \exists e[\textsc{prog}(\textsc{coerce}(\lambda x \lambda s[\textsc{be-friendly}(s, x)]))(e, \textsc{sophia})]$
existential closure

(118) Sophia is friendly.

a. $[\![\text{is friendly}]\!]_{\textsc{aux}}$
$\equiv \lambda x \lambda s[\textsc{coerce}(\textsc{be-friendly}(s, x))]$

coercion operator is applied to VP

$\equiv \lambda x \lambda s[\text{BE-FRIENDLY}(s, x)]$ coercion operator returns unchanged VP

b. $[\![\text{Sophia is friendly}]\!]$
$\equiv \lambda x \lambda s[\text{BE-FRIENDLY}(s, x)](\text{SOPHIA})$
$\equiv \lambda s[\text{BE-FRIENDLY}(s, \text{SOPHIA})]$
$\equiv \exists s[\text{BE-FRIENDLY}(s, \text{SOPHIA})]$ existential closure

Pulman (1997) explains meaning adaptation in terms of an underspecified coercion buffer which may be deployed at the VP level whenever and however many times is necessary. It could also dissolve without a trace. His calculus is modeled on the aspectual transition network of Moens and Steedman (1988). Sophia's friendliness is equally easy to process irrespective of whether it is a state or an activity, because no repair is taking place.

4.4.2 Egg (2005)

Egg (2005, 2011) proposes an underspecification formalism called *constraint language for lambda structure* in which semantic underspecification arises during composition in particular, reinterpretation-friendly syntactic positions. The gaps are not introduced by lexical items themselves, but appear due to the interplay between syntax and semantics.

Egg's approach is similar to Pulman (1997) in that the gaps are inserted in the structure on purpose in order to avoid any clashes. Reinterpretation candidates are semantically underspecified with a buffer that absorbs any potential conflicts. The missing information is filled in by contextual and extra-sentential knowledge as needed. However, according to Egg only one instance of coercion may happen at a time and the specification may be only partial, in which case some gaps remain. Furthermore, he hypothesizes that both complement coercion and aspectual coercion proceed in the same way.

If the sentence is specified based only on the content of the sentence, then Egg views this as a case of simple composition. If other information is needed in order to fully specify the meaning of the clause, then coercion is necessary. In the case of a semantically and aspectually well-formed expression like *Natascha played ping-pong in the park for two years*, the reader can interpret the sentence compositionally and assume that Natascha was tirelessly playing outside during the entire two-year duration. Nevertheless, it is more likely that the sentence is reinterpreted iteratively as Natascha repeatedly visiting the park to play ping-pong during that time, but staying at other places, too.

In sum, Egg (2005, 2011) suggests that coercion updates information in a monotonic, non-destructive way. Under his perspective, reinterpretation is not a repair mechanism: nothing must be undone, but need only be supplemented by additional material. Therefore, whether Sophia is friendly in a stative or active way is irrelevant for the interpreter's mental load, as both are easily achieved.

4.4.3 Dölling (2014)

Dölling (2014) adopts a strategy very similar to Pulman (1997) and Egg (2005, 2011). He argues that linguistically determined meaning is strongly underspecified and "adjustments of aspect are regarded as context-driven enrichments which are carried out in the course of interpretation and have no impact on semantic compositionality" (Dölling 2014, p. 192).

Similarly to Egg (2005), Dölling hypothesizes that only one coercion may happen at the same time. In contrast to the previous two approaches, Dölling suggests that all types of coercion have the same underlying mechanism. Furthermore, he proposes a fine-grained coercion system that predicts the kind of coercion that occurs between two eventualities based on their relation.

In keeping with Pulman (1997) and Egg (2005, 2011), Dölling (2014) argues for a two-stage approach to aspectual coercion. In the first stage, an underspecified coercion operator is inserted during semantic composition and the utterance is processed strictly compositionally. During the second stage, the representation is specified based on world knowledge and other pragmatic factors. This is straightforward in cases without mismatches. Should coercion be necessary, it is realized in the second stage by enriching the composition through these extra-sentential influences.

Despite their differences, all types of aspectual coercions have the same general underlying structure as in (119). The template expresses the fact that there is some intersortal relation SHIFT between two eventualities e and e'. This relation maps from properties P of eventualities of one sort e onto properties of eventualities of another sort e' (Dölling 2014, p. 219–220). An existential or universal quantifier Q ranges over the target eventuality. Both the exact SHIFT relation and the quantifier vary depending on the particular coercion that is taking place.

(119) $\lambda P \lambda e Q e' : \textsc{shift}(e', e)[P(e')]$

Dölling proposes the coercion framework depicted in Figure 4.5. The coercion operations systematically transform an expression of one aspectual class into another aspectual class. His ontology of eventualities differs from the one adopted in this chapter (Figure 4.1) and the web of coercions is quite intricate. As the focus of this thesis is on agentivity, other coercions must take a backseat. Besides, it is time to revisit Sophia the Friendly in her stative (123) and active (125) disposition.

There is one more stop we need to make before exploring the paths to a state and an activity interpretation proposed by Dölling (2014). In the examples (123) and (125) below, the variables e are used for eventualities, P for predicates, and IN PROG to express the progressive. In addition to the familiar existential closure, Dölling makes use of *event identification*, which was so far mentioned only in passing. Event identification is a conjunction operation which enables linking together various external arguments for the event described by an utterance (Kratzer 1996). Recall the purring cat example (97), where the cat, the purring, the softness, the location, etc. were chained through the $\wedge$ conjunction. Event identification allows us to make

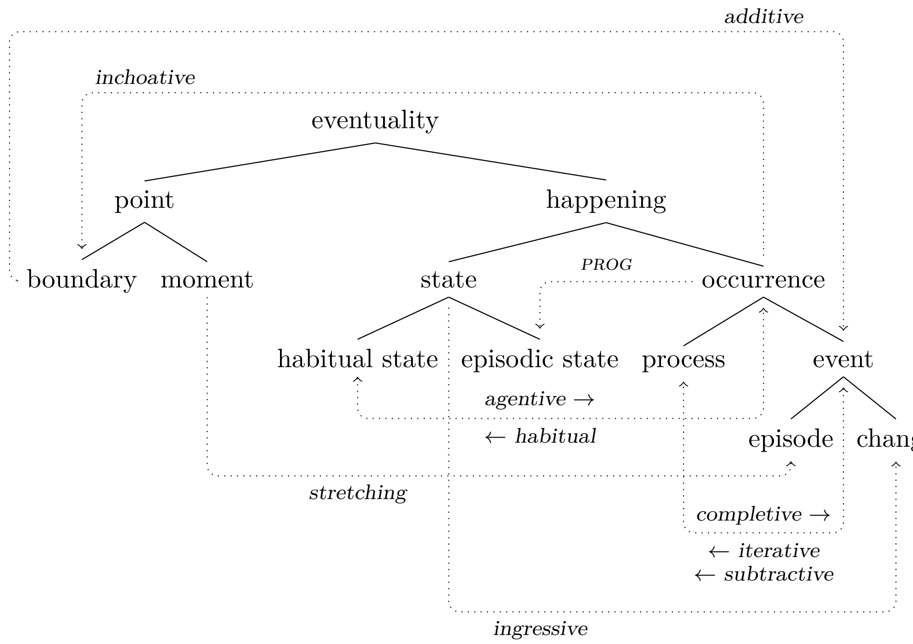


Figure 4.5: Coercion framework adapted from Dölling (2014). Arrows indicate the shifting direction in cases where bidirectional coercion is possible.

the connection that these arguments are in fact part of one and the same event.

(120) HOLDER thematic role: $\lambda x \lambda e_6[\textsc{hd}(x, e_6)]$

(121) agentive coercion: $\lambda P \lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)[P(e_3)]$

(122) PROG coercion: $\lambda P \lambda e_4 \exists e_5 : \textsc{in prog}(e_4, e_5)[P(e_5)]$

First, consider how the stative *Sophia is friendly* is computed in (123). Dölling treats the predicate *be friendly* as a whole entity expressing a state (123b). In the next step (123c), the unnamed subject who is bearing the friendliness is added through the HOLDER thematic role (120). The holder of the friendliness property is not part of the predicate's internal argument in the way that e.g. *the book* is in *Julian read the book.* Instead, it is an external argument and is integrated through the ∧ conjunction. Nevertheless, both the holder and the friendliness are part of the same state, which is determined through event identification. Lastly, Sophia herself is assigned the Θ-role in (123d). Thus, (123) expresses a state of Sophia holding the friendliness property.

By contrast, the derivation of the active counterpart of *Sophia is friendly* in (124) necessitates agentive coercion. Agentive coercion (121) shifts the state of friendliness to a dynamic eventuality (124a) as illustrated in Figure 4.5. The shifting relation underlying agentive coerion is the inverse operation of REAL or "is realized by". Sophia is habitually in the state of friendliness; she is the walking and talking stereotype of a friendly person. Agentive coercion transforms this state into a particular occurrence that is realized by the friendly habitual state. From there on out, the computation continues as in (123). If there is contextual reason to interpret *Sophia is friendly* actively, then (124) refers to the activity which is realized by displaying her stative friendliness.

(123) Sophia is friendly. stative

a. $[\![\text{Sophia}]\!] \equiv \textsc{sophia}$

b. $[\![\text{be friendly}]\!] \equiv \lambda e_1[\textsc{be friendly}(e_1)]$

c. $[\![\text{be friendly}]\!]$ integrating the θ-role

$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6)] \wedge \lambda e_1[\textsc{be friendly}(e_1)]$

$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6) \wedge \textsc{be friendly}(e_6)]$ event identification

d. $[\![\text{Sophia is friendly}]\!]$

$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6) \wedge \textsc{be friendly}(e_6)](\textsc{sophia})$

$\equiv \lambda e_6[\textsc{hd}(\textsc{sophia}, e_6) \wedge \textsc{be friendly}(e_6)]$

$\equiv \exists e_6[\textsc{hd}(\textsc{sophia}, e_6) \wedge \textsc{be friendly}(e_6)]$ existential closure

(124) Sophia is friendly. active

a. $[\![\text{be friendly}_{\textsc{agentive}}]\!]$ agentive coercion

$\equiv \lambda P \lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)[P(e_3)](\lambda e_1 \ \textsc{be friendly}(e_1))$

$\equiv \lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)[\lambda e_1 \ \textsc{be friendly}(e_1)(e_3)]$

$\equiv \lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)[\textsc{be friendly}(e_3)]$

b. $[\![\text{be friendly}_{\textsc{agentive}}]\!]$ integrating the θ-role

$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6)] \wedge \lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)[\textsc{be friendly}(e_3)]$

$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6) \wedge \forall e_3 : \textsc{real}^{-1}(e_3, e_6)[\textsc{be friendly}(e_3)]$

event identification

c. $[\![\text{Sophia is friendly}_{\textsc{agentive}}]\!]$

$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6) \wedge \forall e_3 : \textsc{real}^{-1}(e_3, e_6)[\textsc{be friendly}(e_3)]$
$(\textsc{sophia})$

$\equiv \lambda e_6[\textsc{hd}(\textsc{sophia}, e_6) \wedge \forall e_3 : \textsc{real}^{-1}(e_3, e_6)[\textsc{be friendly}(e_3)]$

$\equiv \exists e_6[\textsc{hd}(\textsc{sophia}, e_6) \wedge \forall e_3 : \textsc{real}^{-1}(e_3, e_6)[\textsc{be friendly}(e_3)]$

existential closure

The final example in (125) illustrates the derivation of *Sophia is being friendly*, which necessitates another mechanism to account for the progressive. The progressive operator PROG in (122) expresses the fact that there is an eventuality which is in progress. In Dölling's coercion network in Figure 4.5, PROG shifts a dynamic eventuality to a stative one.

During the interpretation of (125), the parser is faced with an upcoming clash between the state (125a) and the progressive, which requires an activity as its input. In order to counteract this conflict, the state is shifted to a dynamic eventuality through coercion (125b). Only then can it be combined with the progressive operator (125c). PROG, in turn, shifts the eventuality again from an activity to a state, although a different one than we started with.

The remaining steps are the same as in (123): first, the thematic role is integrated and later Sophia herself takes on the holder role. Overall, (125) refers to the state of Sophia, which is the being in progress of an activity that realizes her habitual, stative friendliness.

(125) Sophia is being friendly.

a. $[\![\text{be friendly}]\!] \equiv \lambda e_1[\textsc{be friendly}(e_1)]$ =(123b)

b. $[\![\text{be friendly}_{\textsc{agentive}}]\!]$ =(124a)
$\equiv \lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)[\textsc{be friendly}(e_3)]$ agentive coercion

c. $[\![\text{being friendly}]\!]$
$\equiv \lambda P \lambda e_4 \exists e_5 : \textsc{in prog}(e_4, e_5)[P(e_5)](\lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)$
$[\textsc{be friendly}(e_3)])$ PROG coercion
$\equiv \lambda e_4 \exists e_5 : \textsc{in prog}(e_4, e_5)[\lambda e_2 \forall e_3 : \textsc{real}^{-1}(e_3, e_2)$
$[\textsc{be friendly}(e_3)](e_5)]$
$\equiv \lambda e_4 \exists e_5 : \textsc{in prog}(e_4, e_5)[\forall e_3 : \textsc{real}^{-1}(e_3, e_5)$
$[\textsc{be friendly}(e_3)]]$

d. $[\![\text{being friendly}]\!]$ integrating the θ-role
$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6)] \wedge \lambda e_4 \exists e_5 : \textsc{in prog}(e_4, e_5)[\forall e_3 : \textsc{real}^{-1}(e_3, e_5)$
$[\textsc{be friendly}(e_3)]]$
$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6) \wedge \exists e_5 : \textsc{in prog}(e_6, e_5)[\forall e_3 : \textsc{real}^{-1}(e_3, e_5)$
$[\textsc{be friendly}(e_3)]]]$ event identification

e. $[\![\text{Sophia is being friendly}]\!]$
$\equiv \lambda x \lambda e_6[\textsc{hd}(x, e_6) \wedge \exists e_5 : \textsc{in prog}(e_6, e_5)[\forall e_3 : \textsc{real}^{-1}(e_3, e_5)$
$[\textsc{be friendly}(e_3)]]](\textsc{sophia})$
$\equiv \lambda e_6[\textsc{hd}(\textsc{sophia}, e_6) \wedge \exists e_5 : \textsc{in prog}(e_6, e_5)[\forall e_3 : \textsc{real}^{-1}(e_3, e_5)$
$[\textsc{be friendly}(e_3)]]]$
$\equiv \exists e_6[\textsc{hd}(\textsc{sophia}, e_6) \wedge \exists e_5 : \textsc{in prog}(e_6, e_5)[\forall e_3 : \textsc{real}^{-1}(e_3, e_5)$
$[\textsc{be friendly}(e_3)]]]$ existential closure

To sum up, Dölling (2014) attributes both the stative and the agentive interpretation of *Sophia is friendly* to an underspecified meaning representation, which is compositionally shifted to a state or an activity based on contextual information. A network of coercions, which share the same underlying structure, systematically organizes all possible aspectual transitions.

The underspecification approaches summarized in this chapter share the notion that an utterance is processed in two stages. Initially, a heavily underspecified representation is drafted. In the second step, the missing information is supplied by the discourse context, conceptual knowledge, or other pragmatic sources. Furthermore, all three theories agree that Sophia's stative and agentive dispositions are the result of closing the gaps in interpretation in a non-destructive way (see also Rothstein (1999, 2004) in Chapter 3).

4.5 Chapter Summary

The aim of this chapter was to fill in some gaps left by the previous ones. It reviewed the role of the subject in agentive copular sentences and settled for Sophia over other subject types. Next, it briefly discussed the advantages of (neo-)Davidsonian event semantics over predicate logic, before turning to the nature of events themselves. The subsequent sections focused on aspectual classes of verbs and what it means to be a state or an activity in relation to Sophia's passive and active friendliness. These theoretical considerations lead to the conclusion that *Sophia is being friendly* is an activity, whereas *Sophia is friendly* is typically, though not necessarily, a state.

The second half of the chapter addressed two mechanisms underlying the different approaches to agentivity: coercion and underspecification. Several frameworks concerned with the emergence of complement coercion and aspectual coercion paved the way to understanding agentive coercion. Agentive coercion was characterized as a repair mechanism which shifts a state into either an activity or a dynamic state. The final sections outlined three underspecification theories in relation to their account of agentivity. According to the underspecification approaches, both the stative and the dynamic interpretations of *Sophia is (being) friendly* are the product of the disambiguation of an incomplete meaning representation.

Having gathered all the elements (subject, verb, predicate) and tools (coercion, underspecification) required for agentivity, we can venture into the real world of empirical studies on underspecification and coercion.

5 Underspecification and Coercion in Psycholinguistics

A brief overview of psycholinguistic studies on underspecification and coercion during sentence processing is in order before we advance to our own empirical investigations, as the two mechanisms are quite distinct. Out of the two, underspecification is deemed the less resource-intensive one. Constructing an underspecified meaning representation on its own is straightforward and effortless. Completing the representation in a non-destructive fashion once the appropriate material has been encountered or interpolated is no more taxing than simple composition. In psycholinguistic studies, this translates to null effects (or no differences) for underspecified sentences compared to neutral control sentences. Some of the studies discussed in this chapter make explicit predictions expecting null effects for underspecification (Bott 2010; Lukassek et al. 2017). However, the majority is targeting only coercion. It is worth noting that some authors argue that specification of an underspecified representation results in observable effort in processing(Dölling 2014; Foraker and Murphy 2012). For example, Dölling (2014) proposes that some interpretational difficulty attributed to coercion is in fact evidence for (under)specification. I follow the conventional assumption that all types of underspecification are harmless in processing.

There is a multitude of studies on coercion effects, predominantly focusing on complement coercion and iterative coercion. Most psycholinguistic studies provide evidence for processing costs associated with this form of meaning adaptation (see e.g. Brennan and Pylkkänen 2008; Frisson, Pickering, et al. 2011; Husband, Kelly, et al. 2011; McElree, Frisson, et al. 2006; Pylkkänen and McElree 2006; Traxler, McElree, et al. 2005), but others do not (R. G. de Almeida 2004; Lai et al. 2017; Pickering, McElree, Frisson, et al. 2006). There is some indication that not all types of coercion are created equal (Bott 2008, 2010; Katsika et al. 2012). Some of the coercion theories presented in the previous chapter hypothesized that some shifts in interpretation require more than one coercion to happen either in sequence or at the same time. If that were the case, this might explain the observed effect diversity, although the evidence in support of this is mixed.

To provide a clear and systematic overview of processing costs associated with coercion, this chapter summarizes the findings of over 30 psycholinguistic studies on various types of coercion. The studies are divided into three categories based on their methodology: (i) experiments involving reading time data (Table 5.1); (ii) experiments involving event related potentials (ERPs) and brain imaging (Table 5.2); and (iii) all other kinds of data (Table 5.3). Within each category, the studies are sorted by reinterpretation phenomenon (aspectual and complement coercion), methods (e.g. self-paced reading, eye-tracking), and lastly in alphabetical order of first author. The remainder of the chapter introduces the various experimental paradigms, measures, and effects that accompany coercion. If the reader is familiar with psycholinguistic measures, they may wish to skip the remaining paragraphs and proceed to the tables starting at page 82.

Self-paced reading studies typically involve the participants reading a sentence or text which is presented to them either all at once or in increments (e.g. word-by-word or phrase-by-phrase). The participants have control over when the next sentence, word, or text fragment will appear. The time spent reading a particular text or text fragment is recorded. Longer reading times are indicative of difficulty in processing or integrating information.

In reading time studies (see Table 5.1), both aspectual and complement coercion elicit longer reading times than neutral controls, but these effects can be modulated, e.g. through verb type, clause boundaries, or context. In self-paced reading studies, coercion is frequently fast and resolved close to the trigger interest area (IA).

Eye-tracking during reading studies resemble self-paced reading ones in that the participants read a word, sentence, or text. Typically, the stimuli are presented all at once, which leads to a more natural reading behavior than in a self-paced reading setting. During reading, the participants' eye movements are recorded. Eye-tracking studies allow for a variety of measures to be inspected. These can be divided into measures showing early (e.g. word recognition) and late processing effects (e.g. semantic and discourse processing). Early eye-tracking measures include first pass reading times, first pass regression ratios, first fixation duration, single fixation duration, and regression path duration. Later eye-tracking measures associated with re-reading include second pass reading times, second pass regression ratios, proportions of regressions into a region of interest, and total reading times. Regression proportions are assumed to capture later stages of language processing. Regression path duration is by some considered to be an early measure, while others hold it to be a late one (for an overview, see Carpenter and Just 1977; Liversedge et al. 2011; Rayner 1998).

A *fixation* is the moment during which the eyes are stationary and the reader is reading or taking in information. A longer fixation duration on a particular interest area indicates difficulties in processing or collecting information (Just and Carpenter 1976; Poole and Ball 2005; Poole, Ball, and P. Phillips 2004). *First fixation duration* is the length of the first fixation to fall inside of the interest area. *Single fixation duration* is the length of the first fixation on the interest area if it only received one fixation during the first pass reading (Juhasz and Pollatsek 2011).

First pass reading time or “first run dwell time” (also called “gaze duration” on one-word regions (cf. Rayner and Duffy 1986)) is the sum of all the fixations within an interest area, from the first fixation into that interest area until the first time a fixation falls outside the interest area. First fixation duration and first pass reading time are typically assumed to measure early stages of language processing (e.g. lexical processing). Analogously, *second pass reading time* is the duration of re-reading an interest area after first pass reading. *Total reading time* is the sum of all fixations in an interest area during all stages of reading.

A *regression* or *regressive saccade* is an eye movement between fixations in which the reader moves back in the direction of text to revisit a passage that has already been read. *First pass regression ratios* are the proportions of how frequently the reader initiates a regression from a region during first pass reading. Similarly, *second pass regression ratios* are the proportions of how often the reader initiates a regression during second pass reading.

Regression path duration (or “go-past time”) is the sum of all fixations from the first fixation into that interest area until the subject moves to the right past the interest area into the next one, i.e. continues reading. This measure encompasses the time spent re-reading previous regions and the current interest area before moving on. It may reflect the time needed to process the text enough to be ready to incorporate new information.

Proportions of *regressions in* an interest area reflect how often it has been reentered after the reader had moved onto subsequent text. Proportions of *regressions out* of an interest area measure whether the participant saccaded out of the interest area into an interest area earlier in the sentence.

In eye-tracking studies (see Table 5.1), aspectual coercion costs appear most frequently in first fixation duration, first pass regressions, and second pass reading time. However, some studies also found coercion effects in first pass reading times, regression path duration, total reading times, and regressions in a target interest area. As noted before, not all types of aspectual coercion led to observable effects in eye-tracking. Complement coercion costs are more predictable. They appear most frequently in total reading times and regression path duration. Processing difficulties have also been observed in first pass regression ratios, second pass reading times, and first pass reading times.

Electroencephalography (EEG) measures the brain’s electric charge and the changes in the electric potential activated by a trigger word. Typically, the participants will read a sentence in word by word presentation or listen to prerecorded stimuli. During an experimental session, the participants wear a cap with electrodes that capture the electric potential. EEG has a high temporal resolution and can capture fine-grained changes in processing load, but it has a poor spatial resolution (due to the limitations of electrode number, interference from brain structures and outside noise, among other reasons). Experiments using EEG (see Table 5.2) often find coercion effects in the N400 component in the ventromedial prefrontal cortex (vmPFC), although late sustained positivity and negativity have also been observed (P600, LAN, SAP).

The N400 component is a negativity that appears 250–500 ms and peaks around 400 ms after the onset of a target word. It is generally viewed as reflecting the semantic relationship between a word and the context in which it occurs (see Dudschig et al. 2016; Hagoort and van Berkum 2007; Hagoort, Hald, et al. 2004; Hald et al. 2007; Nieuwland and van Berkum 2006; van Petten 2014, among others). It reveals semantic and world knowledge anomaly or incongruity of a word in an otherwise syntactically sound environment. The amplitude of the N400 component reflects the complexity with which the word is integrated into the overall meaning representation constructed for the preceding sentence input. Whether the amplitude is modulated by the semantic integration process or the effort in retrieving long-term memory representations is unclear. For an overview, see e.g. Kutas and Federmeier (2011), Lau, C. Phillips, et al. (2008), and Osterhout, A. Kim, et al. (2012).

The P600 component is a positivity that appears 500–1200 ms and peaks around 600 ms after stimulus onset. It is sensitive to syntactic violations (Friederici, Hahne, et al. 1996; Gouvea et al. 2010), inflectional incongruity (Osterhout and Mobley 1995), garden path sentences (Osterhout and Holcomb 1992), negative polarity violations (Xiang et al. 2009), animacy restrictions (A. Kim and Osterhout 2005), and semantic anomalies (Bott 2008; van Herten et al. 2005). It is also associated with the syntactic processing of thematic relationships (Meltzer and Braun 2013). If the N400 indicates the implausibility of the unexpected scene, the P600 reflects the deviation from some expected pattern or sequence (Osterhout, A. Kim, et al. 2012).

The left anterior negativity (LAN) component is sensitive to phrase structure and word-category violations (Friederici 2002; Hagoort 2003). It is indicative of morphosyntactic processes (Molinaro et al. 2015), and plays a role in assigning syntactic and thematic relations (Friederici and Weissenborn 2007). LANs have been observed in experiments on working memory (Meltzer and Braun 2013), gap detection (Kluender and Kutas 1993; Rösler et al. 1998), and pseudoword sentences (Münte et al. 1997). It is also sensitive to the context (Lau, Stroud, et al. 2006) and, more importantly, some types of coercion (Bott 2010; Paczynski et al. 2014). LAN can occur around the same latency range as the N400 (300–500 ms) but has also been reported much earlier (100-300 ms). In the latter case, it is frequently referred to as early LAN or ELAN (Steinhauer and Drury 2012).

Sustained anterior positivity (SAP) is a poorly understood component. Kuperberg et al. (2010) report SAP for sentences with complement coercion and interpret it as “an active attempt to retrieve a specific unstated event (or possible set of events) in the coerced sentences to form a discourse-level representation” (pp. 2697–2698). SAP has been reported in studies on prediction violations (Payne and Federmeier 2017), the definite article (Shafer et al. 2005), thematic relations (Cohn et al. 2017), syntactic complexity, and argument structure (Epstein et al. 2013; Zhou and Zhang 2018). The SAP and P600 overlap somewhat in the temporal window (starting at around 400 ms post stimulus) but have different brain distributions: the former is located more in the anterior and the latter in the centro-parietal brain area.

Magnetoencephalography (MEG) measures the magnetic fields generated by neuronal currents (Pylkkänen, Brennan, et al. 2011). The experimental setup of MEG studies resembles that of EEG ones, but the neuromagnetic fields are recorded with a gradiometer rather than a cap with electrodes. MEG has a better spatial resolution than EEG because magnetic fields pass through brain structures relatively undistorted, unlike electric potentials. The temporal resolution is similar to that of EEG, if somewhat lower.

MEG experiments have shown coercion effects in the anterior midline field (AMF). The AMF is sensitive to non-compositional sentence-level interpretation and semantic composition (Brennan and Pylkkänen 2008, 2010). The AMF appears to originate in the ventromedial prefrontal cortex brain region (vmPFC). The vmPFC plays a role in semantic violations but not in world knowledge violations (Pylkkänen, Oliveri, et al. 2009).

Reaction time studies (see Table 5.3) have found longer response latencies and lower accuracy for coercion conditions compared to compositionally simple sentences. Coerced sentences tend to be rated worse than compositional controls in plausibility and acceptability judgments (see e.g. Lukassek et al. 2017), and be rejected as nonsensical more often than neutral controls (Bott 2010, 2013).

Acceptability judgment studies frequently involve the participants reading a sentence or text and rating their naturalness on a Likert scale (Likert 1967). The sentence and scale may be presented simultaneously or in sequence. Makes-sense judgment studies require the participants to read the sentence or text either all at once or incrementally and decide on their overall sensibility (in the latter case, at each step). Similarly, forced-choice and lexical decision paradigms prompt the participants to choose between one of two or more options. Speed-accuracy trade-off relies on the relationship between two requirements in a study: quickly reacting to a (typically forced-choice) question or stimulus, while at the same time making as few errors as possible. Lastly, sentence completion tasks prompt the participants to continue a sentence in a sensible fashion.

Table 5.1: Psycholinguistic experiments on coercion and underspecification using reading times. *ET* = eye-tracking, *Lexsem* = lexical semantics complexity, *reg.* = regression, *RT* = reading time, *SPR* = self-paced reading.

Study	Stimuli	Results and conclusion
Bott (2010) Experiment 2 *SPR*	Hans *joggte* 2 Stunden lang *im Park.* **Activity, atelic adverbial, activity continuation** Hans *joggte* in 2 Stunden *im Park.* **Activity, telic adverbial, activity continuation** Hans *joggte* 2 Stunden lang *durch den ganzen Park.* **Activity, atelic adverbial, accomplishment continuation** Hans *joggte* in 2 Stunden *durch den ganzen Park.* **Activity, telic adverbial, accomplishment continuation** Hans *konstruierte* 2 Stunden lang *an dem Modell herum.* **Accomplishment, atelic adverbial, activity continuation** Hans *konstruierte* in 2 Stunden *an dem Modell herum.* **Accomplishment, telic adverbial, activity continuation** Hans *konstruierte* 2 Stunden lang *das neue Modell.* **Accomplishment, atelic adverbial, accomplishment continuation** Hans *konstruierte* in 2 Stunden *das neue Modell.* **Accomplishment, telic adverbial, accomplishment continuation**	Only activity verbs showed longer RT for telic compared to atelic adverbials. → **aspectual coercion costs, verb's aspectual frequency information predicts the analysis**
Experiment 3 *SPR*	Seit einem halben Jahr schwimmt Hans jeden Morgen *zwei Kilometer in einem Hallenbad. Anfangs benötigte er noch eine knappe Stunde dafür, aber er wird von Tag zu Tag schneller.* **Telic context** Seit einem halben Jahr schwimmt Hans jeden Morgen *in einem Hallenbad. Anfangs konnte er sich noch kaum über Wasser halten, aber mit jedem Tag geht es besser.* **Atelic context** Heute morgen schwamm er *dreißig Minuten lang.* **Control, *for*-target** Heute morgen schwamm er *in nur dreißig Minuten.* **Conflict, *in*-target**	Longer RT for conflict conditions than controls, but the effect was diminished in licensing contexts. → **context modulates aspectual coercion costs**

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Table 5.1 – *Continued from previous page*

Study	Stimuli		Results and conclusion
Experiment 4a	Der Athlet gewann die Medaille *in drei Stunden* bei den Para-Olympics.	**Coercion**	Longer RT for coercion than
SPR	Der Athlet gewann die Medaille *vor drei Stunden* bei den Para-Olympics.	**Control**	control. → **additive coercion is**
	Der Athlet gewann die Medaille *drei Stunden lang* bei den Para-Olympics.	**Mismatch**	**costly**
Experiment 4b	Der Förster entdeckte *in 10 Minuten* im Wald die Falle für Bären.	**Coercion**	Longer RT for coercion than
SPR	Der Förster entdeckte *vor 10 Minuten* im Wald die Falle für Bären.	**Control**	control. → **additive coercion is**
	Der Förster entdeckte *10 Minuten lang* im Wald die Falle für Bären.	**Mismatch**	**costly**
Experiment 5	Hans errichtete *das Haus zwei Jahre lang* trotz finanzieller Probleme.	**Coercion**	RT for coercion and control did
SPR	Hans errichtete *das Haus in zwei Jahren* trotz finanzieller Probleme.	**Control**	not differ irrespective of whether
	Hans errichtete *zwei Jahre lang* trotz finanzieller Probleme *das Haus*...	**Coercion**	the incremental theme is specified
	Hans errichtete *in zwei Jahren* trotz finanzieller Probleme *das Haus*...	**Control**	or not. → **no subtractive coercion costs**
Experiment 6	Eine Studentin nieste *mehrere Tage* überaus laut *auf der Exkursion*,...	**Coercion**	RT for coercion and control did
SPR	Eine Studentin nieste *gerade eben* überaus laut *auf der Exkursion*,...	**Control**	not differ irrespective of whether
	Auf der Exkursion nieste *mehrere Tage* überaus laut eine Studentin,...	**Coercion**	the argument structure is
	Auf der Exkursion nieste *gerade eben* überaus laut eine Studentin,...	**Control**	complete or not. → **no iterative coercion costs**
Experiment 8	Den Haarriss am Wasserrohr bemerkte *in 30 Min* ein aufmerksamer Klempner.	**Coercion**	Mismatch and coercion caused
SPR	Den Haarriss am Wasserrohr bemerkte *vor 30 Min.* ein aufmerksamer Klempner.	**Control**	longer RT than control once argument structure was complete.
	Den Haarriss am Wasserrohr bemerkte *30 Min. lang* ein aufmerksamer Klempner.	**Mismatch**	→ **subtractive coercion costs**

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Table 5.1 – *Continued from previous page*

Study	Stimuli		Results and conclusion
Experiment 10a *SPR*	Der Bauarbeiter belud die Schubkarre *eine Stunde lang*, dann wurde er *woanders eingeteilt.*	**Subtractive coercion, no culmination**	No difficulty for coercion conditions compared to controls. → **no subtractive coercion costs**
	Der Bauarbeiter belud die Schubkarre *in einer Stunde*, dann wurde er *woanders eingeteilt.*	**Control, culmination**	
	Der Bauarbeiter belud die Schubkarre *zwanzig Jahre lang*, dann wurde er *in Rente geschickt.*	**Habitual control**	
	Der Bauarbeiter belud die Schubkarre *in zwanzig Jahren*, dann wurde er *in Rente geschickt.*	**Mismatch**	
Experiment 10b *SPR*	*Den ganzen Morgen* nieste der Junge laut im Klassenzimmer, dann entschuldigte er sich bei seinen Mitschülern.	**Coercion**	No difficulty for coercion conditions compared to control. → **no aspectual coercion costs**
	Heute Morgen nieste der Junge laut im Klassenzimmer, dann entschuldigte er sich bei seinen Mitschülern.	**Control**	
Brennan and Pylkkänen (2008)			
SPR	*All morning long* the cart banged in the cramped store aisle.	**Iterative coercion**	Longer RT for coercion compared to the control condition. → **aspectual coercion costs**
	Just after ten the cart banged in the cramped store aisle.	**Control**	
Brennan and Pylkkänen (2010)			
SPR	*Within a few minutes*, the child *cherished* the precious kitten.	**Coercion**	Longer RT for coercion and lexem conditions compared to control. → **inchoative coercion and semantic complexity costs**
	Without a doubt, the child *scared* the precious kitten.	**Lexsem**	
	Without a doubt, the child *cherished* the precious kitten.	**Control**	
Husband, Beretta, et al. (2006)			
Experiment 1 *SPR*, Todorova et al. (2000a) replication	Howard sent *a large check* to his daughter for years.	**Coercion**	Longer RT for coercion than control conditions. → **aspectual coercion costs**
	Howard sent *large checks* to his daughter for years.	**Control**	

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Experiment 2 *SPR*	The tv producer *cancelled programs* about former celebrities and her reputation was ruined. **+bounded, pl.** The tv producer *cancelled the program* about former celebrities and... **+bounded, sg.** The tv producer *cancelled a program* about former celebrities and... **+bounded, sg.** The tv producer *hosted programs* about former celebrities and... **±bounded, pl.** The tv producer *hosted the program* about former celebrities and... **±bounded, sg.** The tv producer *hosted a program* about former celebrities and... **±bounded, sg.**	Plural conditions had longer RT than singular ones; objects of ±*bounded* verbs are read slower than objects of +*bounded* verbs. → **aspectual coercion costs**
Lukassek et al. (2017) *SPR*	Der Pirat segelte *über die Nordsee*, und zwar *3 Tage lang.* **Ambiguous PP, durative AP** Der Pirat segelte *zur Nordsee*, und zwar *3 Tage lang.* **Telic PP, durative AP** Der Pirat segelte *über die Nordsee*, und zwar *in 3 Tagen.* **Ambiguous PP, completive AP** Der Pirat segelte *zur Nordsee*, und zwar *in 3 Tagen* **Telic PP, completive AP**	Longer RT for telic+durative compared to ambiguous+durative conditions. → **aspectual coercion costs, no underspecification cost**
Todorova et al. (2000a) *SPR*	Even though Howard sent *a large check* to his daughter *for many years*, she refused to accept his money. **Sg. object, durative adverb** Even though Howard sent *large checks* to his daughter *for many years*, she refused to accept his money. **Pl. object, durative adverb** Even though Howard sent *a large check* to his daughter *last year*, she refused to accept his money. **Sg. object, neutral adverb** Even though Howard sent *large checks* to his daughter *last year*, she refused to accept his money. **Pl. object, neutral adverb**	RT for coercion conditions were longer than for controls. → **aspectual coercion costs**

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Study	Stimuli	Results and conclusion
Todorova et al. (2000b) *SPR*	Howard sent *a large check* to his daughter *every year* but as usual, she refused to accept his money. **Sg. object, coercive adverb** Howard sent *large checks* to his daughter *every year* but... **Pl. object, coercive adverb** Howard sent *a large check* to his daughter *last year* but... **Sg. object, neutral adverb** Howard sent *large checks* to his daughter *last year* but... **Pl. object, neutral adverb**	RT for coercion conditions were longer than for controls. → **aspectual coercion costs**
Bott (2013) *ET*	Der Ringer gewann das Turnier *in 3 Stunden*, obwohl es viele Konkurrenten gab. **Coercion, SVOA** Der Ringer gewann das Turnier *vor 3 Stunden*,... **Control, SVOA** Der Ringer gewann das Turnier *ganze 3 Stunden*,... **Mismatch, SVOA** *In 3 Stunden* gewann der Ringer das Turnier,... **Coercion, AVSO** *Vor 3 Stunden* gewann der Ringer das Turnier,... **Control, AVSO** *Ganze 3 Stunden* gewann der Ringer das Turnier,... **Mismatch, AVSO**	Mismatch conditions caused processing difficulty (e.g. total RT, 1st pass regressions), but coercion was as fast as control. → **no aspectual coercion costs**
Bott (2017) *ET*	Seit dem letzten Sommer joggt Maria jeden Tag *einmal durch den ganzen Park*. Als sie damit begann, *brauchte sie mehr als zwei Stunden dafür*, aber mittlerweile läuft sie schon viel schneller. Als es ihr heute Mittag gelang, *in nur sechzig Minuten* zu joggen, war sie positiv überrascht. **Telic context, telic adverbial; coercion** Seit dem letzten Sommer joggt Maria jeden Tag *morgens im nahe gelegenen Park*. Als sie damit begann, *ging ihr immer nach kurzer Zeit die Puste aus*, aber mittlerweile hält sie schon viel länger durch. Als es ihr heute Mittag gelang, *in nur sechzig Minuten* zu joggen, war sie positiv überrascht. **Atelic context, telic adverbial; mismatch** Seit dem letzten Sommer joggt Maria jeden Tag *morgens im nahe gelegenen Park*. Als sie damit begann, *ging ihr immer nach kurzer Zeit die Puste aus*, aber mittlerweile hält sie schon viel länger durch. Als es ihr heute Mittag gelang, *ganze sechzig Minuten* zu joggen, war sie positiv überrascht. **Atelic context, atelic adverbial; control**	Fixation, RT and regression proportions show difficulty in mismatch condition compared to control. → **aspectual coercion costs, which can be modulated by the context.**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Frisson and Frazier (2005)		
Experiment 1 *ET*	Yesterday, I bought *imported beers* at the counter of the local supermarket. **Mass noun, neutral context**	Mass noun+helping context were faster than mass noun+neutral context. → **aspectual coercion costs**
	Yesterday, I bought *three imported beers* at the... **Mass noun, helping context**	
	Yesterday, I bought *imported pears* at the... **Count noun, neutral context**	
	Yesterday, I bought *three imported pears* at the... **Count noun, helping context**	
Experiment 2 *ET*	Yesterday, John wanted *imported beer* after the rich main course. His girlfriend didn't want anything. **Mass noun, neutral context**	Helping context conditions were faster than neutral ones early on, while count noun+neutral were costlier later. → **aspectual coercion costs**
	Yesterday, John wanted *just a small amount of imported beer* after the rich main course. His girlfriend didn't want anything. **Mass noun, helping context**	
	Yesterday, John wanted *imported pear* after the rich main course. His girlfriend didn't want anything. **Count noun, neutral context**	
	Yesterday, John wanted *just a small amount of imported pear* after the rich main course. His girlfriend didn't want anything. **Count noun, helping context**	
Frisson, Pickering, et al. (2011)		
ET	The athlete is convinced that the *difficult mountain* will require all his strengths and extra precautions. As far as I know, he would be one of the first to undertake this feat. **Mismatch**	Mismatch effects were visible in 1st pass regressions, reg. path duration, 2nd pass RT and regressions in. → **aspectual coercion costs**
	The athlete is convinced that the *difficult exercise* will require all his strengths and extra precautions. As far as I know, he would be one of the first to undertake this feat. **Match**	

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Pickering, McElree, Frisson, et al. (2006)		
Experiments 1 and 2 replicate Piñango et al. (1999) with new conditions and a second sentence *ET, SPR*	The insect *glided* effortlessly *until it reached* the far end of the garden. It was in a hurry to return to its nest. **Unfronted, unbounded** The insect *hopped* effortlessly *until it reached* the far end of the garden. It was in a hurry to return to its nest. **Unfronted, bounded** *Until it reached* the far end of the garden, the insect *glided* effortlessly under the moonlight. It was in a hurry to return to its nest. new **Fronted, unbounded** *Until it reached* the far end of the garden, the insect *hopped* effortlessly under the moonlight. It was in a hurry to return to its nest. new **Fronted, bounded**	No coercion effects. → **aspectual coercion is not costly, underspecification; previous effects were task-related**
Experiments 3 and 4 replicate Todorova et al. (2000b) *ET, SPR*	Howard sent *a large check* to his daughter *every year* but as usual, she refused to accept his money. **Singular object, coercive adverb** Howard sent *large checks* to his daughter *every year*... **Plural object, coercive adverb** Howard sent *a large check* to his daughter *last year*... **Singular object, neutral adverb** Howard sent *large checks* to his daughter *last year*... **Plural object, neutral adverb**	No coercion effects. → **aspectual coercion is not costly, underspecification; previous effects were task-related**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Townsend (2013) *ET*	Howard sent *a large check* to his daughter *for many years*, *even though* she still had money. **Main clause, singular object, coercive adverb** Howard sent *large checks* to his daughter *for many years*, *even though* she still had money. **Main clause, plural object, coercive adverb** Howard sent *a large check* to his daughter *last year*, *even though* she still had money. **Main clause, singular object, neutral adverb** Howard sent *large checks* to his daughter *last year*, *even though* she still had money. **Main clause, plural object, neutral adverb** *Even though* Howard sent *a large check* to his daughter *for many years*, she still ran out of money. **Subordinate clause, singular object, coercive adverb** *Even though* Howard sent *large checks* to his daughter *for many years*, she still ran out of money. **Subordinate clause, plural object, coercive adverb** *Even though* Howard sent *a large check* to his daughter *last year*, she still ran out of money. **Subordinate clause, singular object, neutral adverb** *Even though* Howard sent *large checks* to his daughter *last year*, she still ran out of money. **Subordinate clause, plural object, neutral adverb**	Singular object+coercive adverb conditions were more difficult than plural object+coercive adverb conditions. Plural object+non-coercive adverbs were more difficult than singular object+non-coercive adverb. Effects in 1^{st} pass, reg. path duration and total RT. → **aspectual coercion costs**
Bott (2008) Experiment 1 *SPR*	Der Arbeiter belud die Schubkarre *zwanzig Minuten lang*, dann wurde er *zum Chef gerufen*. **Subtractive coercion** Der Arbeiter belud die Schubkarre *in zwanzig Minuten*, dann wurde er *zum Chef gerufen*. **Aspectual control** Der Arbeiter belud die Schubkarre *zwanzig Jahre lang*, dann wurde er *woanders hin versetzt*. **Iterative coercion** Der Arbeiter belud die Schubkarre *in zwanzig Jahren*, dann wurde er *woanders hin versetzt*. **Aspectual mismatch control**	Subtractive coercion was as fast as aspectual control. Iterative coercion (accomplishments) was as slow as aspectual mismatch control. → **some kinds of coercion are costly, whereas others are not**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Experiment 2 *SPR*	*Den ganzen Morgen* nieste der Junge laut im Klassenzimmer, dann entschuldigte er sich bei seinen Mitschülern. **Iterative coercion** *Heute Morgen* nieste der Junge laut im Klassenzimmer, dann... **Non-coercing control**	No effects. → **some kinds of coercion are costly, whereas others are not**
R. G. de Almeida (2004)		
Experiment 1 *SPR*	The secretary *began* the memo long before it was due. **Coercion** The secretary *typed* the memo long before it was due. **Preferred** The secretary *read* the memo long before it was due. **Non-preferred**	No coercion effects. → **complement coercion is not costly**
Experiment 2 *SPR*	*same as Experiment 1 but with context* The secretary would always be sure to work ahead of schedule. She was asked to work on a memo. **Context**	No coercion effects. → **complement coercion is not costly**
Lai et al. (2017)		
SPR	Lady Gaga *started* this CD of American pop hits. **Aspectual verb** Lady Gaga *preferred* this CD of American pop hits. ***Enjoy*-type psych verb** Lady Gaga *loved* this CD of American pop hits. ***Love*-type psych verb**	Aspectual verbs were slower than psychological ones. → **not coercion, but retrieval of lexical functions and ambiguity resolution**
Lai (2017)		
Experiment 2 *SPR*	*"Starry Night" starts* the collection of impressionist oil paintings. **Aspectual verb, inanimate** *Van Gogh started* the collection of impressionist oil... **Aspectual verb, animate** *Van Gogh enjoyed/loved* the collection of impressionist oil... **Control, psych-verb**	aspectual verbs caused longer RTs than controls, no animacy effect → **ambiguity resolution, not complement coercion**

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Table 5.1 – *Continued from previous page*

Study	Stimuli		Results and conclusion
Experiment 3 *ET*	*Context* Musicians often record their pieces for compilation or memorial albums. Many musicians have music libraries that contain tons of albums. Kevin owns numerous CDs by different Jazz musicians. *Target sentences* Dave Brubeck *started* this CD of classic Jazz hits. Dave Brubeck *loved* this CD of classic Jazz hits.	 **Event-biasing** **Neutral** **Constitutive** **Aspectual verb** **Psych verb**	Aspectual verbs were slower than psych ones (1st and 2nd pass reg., reg. path duration) → **ambiguity resolution, not complement coercion**
McElree, Traxler, et al. (2001) *SPR*	The author was *starting* the book in his house on the island. The author was *writing* the book in his house on the island. The author was *reading* the book in his house on the island.	**Coercion** **Composition** **Dispreferred composition**	Initially, coercion is as fast as composition and slower than composition+not preferred; costs arise later. → **complement coercion costs**
Frisson and McElree (2008) *ET*	The *teenager began the novel* as soon as he got to his room upstairs. The *teenager read the novel* as soon as he got to his room upstairs. The *waitress started the coffee* as soon as she returned to the counter. The *waitress served the coffee* as soon as she returned to the counter.	**Strongly preferred, coerced** **Strongly preferred, control** **Weakly preferred, coerced** **Weakly preferred, control**	Coerced conditions caused longer RTs than controls, strongly preferred+coerced caused longer RTs than weakly preferred+coerced. → **complement coercion costs**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Katsika et al. (2012)		
ET	The new interns, Alexandra and John, loved to read novels. **Context** Alexandra was *completing* a sci-fi book when the secretary announced the meeting. **Aspectual** Alexandra was *enjoying* a sci-fi book when the secretary announced... **Psych** Alexandra was *shelving* a sci-fi book when the secretary announced... **Control**	Longer RTs and more reg. for aspectual verbs compared to controls. → **complement coercion costs only for aspectual verbs**
Lowder and Gordon (2015)		
Experiment 1 *ET*	The memo was *begun* by the secretary this morning *so that* it can be mailed this afternoon. **Simple sentence, coercion** The memo was *written* by the secretary this morning *so that* it can be mailed this afternoon. **Simple sentence, control** The memo *that* was *begun* by the secretary this morning needs to be mailed this afternoon. **Relative clause, coercion** The memo *that* was *written* by the secretary this morning needs to be mailed this afternoon. **Relative clause, control**	Coercion costs emerged in 1st and 2nd pass RT, reg. path duration, and total RT. The magnitude was reduced if the verb and complement were separated by a clause boundary. → **complement coercion costs are reduced across boundaries**
Experiment 2 *ET*	*It was* the secretary that *began* the memo about the new office policy shortly after being hired. **Cleft, coercion** *It was* the secretary that *wrote* the memo about the new office... **Cleft, control** *What* the secretary *began* was the memo about the new office... **Pseudocleft, coercion** *What* the secretary *wrote* was the memo about the new office... **Pseudocleft, control**	Coercion costs (regression path duration and later measures) are reduced when there is a clause boundary. → **complement coercion costs are reduced across boundaries**
McElree, Frisson, et al. (2006)		
ET	The gentleman *spotted* Dickens while waiting for a friend to arrive. **Conventional form** The gentleman *read* Dickens while waiting for a friend to arrive. **Standard metonym** The gentleman *started* Dickens while waiting for a friend to arrive. **Logical metonym**	Logical metonym conditions were more difficult than conventional expressions (1st pass reg., total RT). → **complement coercion costs**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Pickering, McElree, and Traxler (2005)		
Replication of R. G. de Almeida (2004) with a new condition *ET*	The carpenter *began* the table during the morning break. **Coerced** The carpenter *built* the table during the morning break. **Preferred** The carpenter *sanded* the table during the morning break. **Dispreferred** The carpenter *began building* the table during the morning break. new **Full-VP preferred**	Old stimuli showed weak coercion effects (in 1st pass reg.), new stimuli showed stronger coercion effects (1st pass reg., total RT) compared to other conditions. → **complement coercion costs**
Scheepers, Mohr, et al. (2004)		
ET	The {*student*, *author*} *began* the book with great pleasure,... **Metonymic verb** The {*student*, *author*} *read* the book with great pleasure,... **Non-metonymic control verb** The {*student*, *author*} *wrote* the book with great pleasure,... **Non-metonymic control verb**	Metonymic condition verbs were more difficult than controls. → **complement coercion costs**
Scheepers, Keller, et al. (2008)		
ET	The artist *started* the flowery picture using the depicted *paint brushes/magnifying glass.* **Metonymic verb** The artist *painted* the flowery picture using the depicted *paint brushes.* **Preferred verb** The artist *analyzed* the flowery picture using the depicted *magnifying glass.* **Non-preferred verb**	Difference in gaze probabilities showed difficulties for metonymic verbs compared to non-metonymic verbs (visual world paradigm). → **serial coercion costs**
Traxler, Pickering, et al. (2002)		
Experiment 1 *ET*	The secretary *began* the memo about the new office policy. **Coercion** The secretary *typed* the memo about the new office policy. **Composition, preferred** The secretary *read* the memo about the new office policy. **Composition, non-preferred**	2nd pass RT and total RT were longer for coercion compared to non-preferred, more reg. in coercion compared to preferred. → **complement coercion costs**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Experiments 2 and 3 *ET, SPR*	The boy *started* the fight after school today. **Event verb, event NP** The boy *saw* the fight after school today. **Neutral verb, event NP** The boy *started* the puzzle after school today. **Event verb, entity NP** The boy *saw* the puzzle after school today. **Neutral verb, entity NP**	Longer 1st pass RT and reg. path duration for event NP vs. entity NP, opposite effect in 2nd pass RT. RT difficulty for event verb + entity NP. → **complement coercion costs**
Traxler, McElree, et al. (2005)		
Experiments 1 and 2 *ET*	The contractor had been *building in the suburbs.* That spring, he *began* a condominium next to the shopping center. **Event context, coercing target** The contractor had been *looking for new jobs.* That spring, he *began* a condominium next to the shopping center. **Neutral context, coercing target** The contractor had been *building in the suburbs.* That spring, he *built* a condominium next to the shopping center. **Event context, control target** The contractor had been *looking for new jobs.* That spring, he *built* a condominium next to the shopping center. **Neutral context, control target**	Exp 1: Coercion conditions were more difficult than controls. Exp 2: Coercion conditions were more difficult than controls but context modulated the effects. → **complement coercion costs, which can be modulated by the context**
Experiment 3 *ET*	The student *started* a book in his dorm room. Before he *started* the book about the opium trade, he checked his e-mail. **Coercing context, coercing target** The student *read* a book in his dorm room. Before he *started* the book about the opium trade, he checked his e-mail. **Control context, coercing target** The student *started* a book in his dorm room. Before he *read* the book about the opium trade, he checked his e-mail. **Coercing context, control target** The student *read* a book in his dorm room. Before he *read* the book about the opium trade, he checked his e-mail. **Control context, control target**	Costs associated with coercion were eliminated with context. → **complement coercion costs, which can be modulated by the context**

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Table 5.1 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Experiment 4 *ET*	The student *started* a book in his dorm room. Before he *started* it, he checked his e-mail. **Coercing context, coercing target** The student *read* a book in his dorm room. Before he *started* it, he checked his e-mail. **Control context, coercing target** The student *started* a book in his dorm room. Before he *read* it, he checked his e-mail. **Coercing context, control target** The student *read* a book in his dorm room. Before he *read* it, he checked his e-mail. **Control context, control target**	Costs associated with coercion were eliminated with context. → **complement coercion costs, which can be modulated by the context**

Table 5.2: Psycholinguistic experiments on coercion and underspecification using event related potentials. *AG* = angular gyrus, *AMF* = anterior midline field, *AP* = adverbial phrase, *ATC* = anterior temporal cortex, *ATL* = anterior temporal lobe, *EEG* = electroencephalography, *fMRI* = functional magnetic resonance imaging, *LIF* = left inferior frontal, *LAN* = late anterior negativity, *Lexsem* = lexical semantics complexity, *LH* = left hemisphere, *MEG* = magnetoencephalography, *psych* = psychological, *SAP* = sustained anterior positivity, *vmPFC* = ventromedial prefrontal cortex.

Study	Stimuli		Results and conclusion
Baggio, van Lambalgen, et al. (2008)			
EEG	The door of the living room was closed. Inside the radio played classical music.	**Context**	Larger N400 for neutral vs. disabling nouns. Accomplishments with disabling nouns evoked LANs and participants most frequently judged the letter as unfinished (activity and neutral noun condition most frequently as finished).
	The girl was writing *letters* when her friend spilled coffee on the *tablecloth*.	**Activity, neutral noun**	
	The girl was writing *letters* when her friend spilled coffee on the *paper*.	**Activity, disabling noun**	
	The girl was writing *a letter* when her friend spilled coffee on the *tablecloth*.	**Accomplishment, neutral noun**	
	The girl was writing *a letter* when her friend spilled coffee on the *paper*.	**Accomplishment, disabling noun**	→ **aspectual coercion costs**
Bott (2010)			
EEG	*In 2 Stunden* hatte der Förster die Falle entdeckt, obwohl sie gut versteckt war.	**Additive coercion**	LAN for coercion, P600 for mismatch, no N400.
	Vor 2 Stunden hatte der Förster die Falle entdeckt, obwohl sie gut versteckt war.	**Control**	→ **aspectual coercion costs, different from mismatch**
	Ganze 2 Stunden hatte der Förster die Falle entdeckt, obwohl sie gut versteckt war.	**Mismatch**	

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Table 5.2 – *Continued from previous page*

Study	Stimuli		Results and conclusion
Paczynski et al. (2014)			
EEG	Lilly's kitty was always having small adventures.	**Context**	LAN to punctive verbs in durative contexts compared to frequentative ones. Durative verbs were unaffected by context type. → **aspectual coercion costs**
	After several minutes the cat *pounced* on the rubber mouse.	**Punctive AP, punctive verb**	
	For several minutes the cat *pounced* on the rubber mouse.	**Durative AP, punctive verb**	
	Several times the cat *pounced* on the rubber mouse.	**Frequentative AP, punctive verb**	
	After several minutes the cat *prowled* about the backyard.	**Punctive AP, durative verb**	
	For several minutes the cat *prowled* about the backyard.	**Durative AP, durative verb**	
	Several times the cat *prowled* about the backyard.	**Frequentative AP, durative verb**	
Brennan and Pylkkänen (2008)			
MEG	*All morning long* the cart banged in the cramped store aisle.	**Coercion**	AMF for coercion conditions vs. control condition in vmPFC. → **aspectual coercion costs**
	Just after ten the cart banged in the cramped store aisle.	**Control**	
Brennan and Pylkkänen (2010)			
MEG	*Within a few minutes*, the child *cherished* the precious kitten.	**Coercion**	Greater activity for coercion in vmPFC, LH aTL. → **aspectual coercion costs**
	Without a doubt, the child *scared* the precious kitten.	**Lexsem**	
	Without a doubt, the child *cherished* the precious kitten.	**Control**	
Baggio, Choma, et al. (2010)			
EEG	The journalist *began* the article before his coffee break.	**Coercing**	N400 in anomalous and coercing conditions compared to control. → **complement coercion costs**
	The journalist *astonished* the article before his coffee break.	**Anomalous**	
	The journalist *wrote* the article before his coffee break.	**Control**	
Kuperberg et al. (2010)			
EEG	The journalist *began* the article before his coffee break.	**Coerced**	N400 in anomalous and coercing conditions, SAP for coerced and P600 for anomalous conditions. → **complement coercion costs**
	The journalist *astonished* the article before his coffee break.	**Anomalous**	
	The journalist *wrote* the article before his coffee break.	**Control**	

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Table 5.2 – *Continued from previous page*

Study	Stimuli		Results and conclusion
Pylkkänen and McElree (2007)			
MEG	The journalist *began* the article after his coffee break.	**Coerced**	AMF for coercion conditions vs. control condition in vmPFC. → **complement coercion costs**
	The journalist *astonished* the article after his coffee break.	**Anomalous**	
	The journalist *wrote* the article after his coffee break.	**Control**	
Pylkkänen, Martin, et al. (2009)			
MEG	The gymnastics committee judged the *beam* unmasterable after trying *it out themselves*.	**Coercion**	AMF for coercion conditions compared to control condition in vmPFC. → **complement coercion costs**
	The gymnastics committee judged the *dance* unmasterable after trying *many different choreographers*.	**Control**	
Lai et al. (2017)			
fMRI	Lady Gaga *started* this CD of American pop hits.	**Aspectual verb**	Activation in Wernicke's area for aspectual vs. *enjoy*-verbs, LIF cortex activation for aspectual vs. *love*-verbs. → **retrieval of lexical functions, ambiguity resolution, not coercion**
	Lady Gaga *preferred* this CD of American pop hits.	***Enjoy*-type psych verb**	
	Lady Gaga *loved* this CD of American pop hits.	***Love*-type psych verb**	
Lai (2017)			
fMRI	*"Starry Night" starts* the collection of impressionist oil paintings.	**Aspectual verb, inanimate**	Animate conditions caused additional brain activity vs. inanimate ones → **ambiguity, not complement coercion**
	Van Gogh started the collection of impressionist oil paintings.	**Aspectual verb, animate**	
	Van Gogh enjoyed/loved the collection of impressionist oil paintings.	**Control, psych-verb**	
Husband, Kelly, et al. (2011)			
fMRI	The novelist *began* the book before break.	**Coercion**	LIF gyrus activation for coercion, activation in left ATC and the bilateral AG for other violations. → **complement coercion costs**
	The novelist *annoyed* the book before break.	**Semantic violation**	
	The novelist *write* the book before break.	**Syntactic violation**	
	The novelist *wrote* the book before break.	**Control**	

Table 5.3: Psycholinguistic experiments on coercion and underspecification using reaction times and offline measures.

Study	Stimuli		Results and conclusion
Bott (2010)			
Experiment 1 *incremental makes sense judgments*	Der Kletterer *bestieg* den Gipfel *in zwei Std.* von Norden.	**Control**	Subtractive and additive coercion conditions were rejected more often than composition controls but less than mismatch. → **coercion costs**
	Der Kletterer *bestieg* den Gipfel *zwei Std. lang* von Norden.	**Subtractive coercion**	
	Der Kletterer *erreichte* den Gipfel *in zwei Std.* von Norden.	**Additive coercion**	
	Der Kletterer *erreichte* den Gipfel *zwei Std. lang* von Norden.	**Mismatch**	
Experiment 7 *acceptability judgments, sentence completion task*	Der Bergsteiger$_{nom}$ erreichte$_{sg}$ 2 Std. lang...	**SVO, singular subject**	Items were rejected as nonsensical, no difference in *numerus*, only a few bare plural completions, more sensible completions in SVO conditions. → **aspectual coercion is impossible until argument structure is complete**
	Den Gipfel$_{acc}$ erreichte$_{sg}$ 2 Std. lang...	**OVS, singular subject**	
	2 Std. lang erreichte$_{sg}$...	**Adverbial+verb, singular subject**	
	Die Bergsteiger$_{nom./acc}$ erreichten$_{pl}$ 2 Std. lang...	**SVO, plural subject**	
	Den Gipfel$_{acc}$ erreichten$_{pl}$ 2 Std. lang...	**OVS, plural subject**	
	2 Std. lang erreichten$_{pl}$...	**Adverbial+verb, plural subject**	
Lukassek et al. (2017)			
acceptability judgments	Der Pirat segelte *über die Nordsee*, und zwar *3 Tage lang.*	**Ambiguous PP, durative AP**	Lower acceptability for telic PP and durative AP conditions compared to ambiguous PP and durative AP ones. → **aspectual coercion costs, no underspecification cost**
	Der Pirat segelte *zur Nordsee*, und zwar *3 Tage lang.*	**Telic PP, durative AP**	
	Der Pirat segelte *über die Nordsee*, und zwar *in 3 Tagen.*	**Ambiguous PP, completive AP**	
	Der Pirat segelte *zur Nordsee*, und zwar *in 3 Tagen*	**Telic PP, completive AP**	
Piñango, Zurif, et al. (1999)			
dual task, cross-modal lexical decision	The man *kicked* the little bundle of fur for a long time to see if it was alive.	**Coercion**	Reaction times were slower for sentences with coercion. → **aspectual coercion costs**
	The man *examined* the little bundle of fur for a long time to see if it was alive.	**Control**	

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Table 5.3 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Piñango, Winnick, et al. (2006) *dual task, cross-modal lexical decision*	The insect *hopped* effortlessly until it reached the far end of the garden that was hidden in the shade. **Coercion** The insect *glided* effortlessly until it reached the far end of the garden... **Control**	Reaction times were slower for sentences with coercion. → **aspectual coercion costs**
Lai (2017) *acceptability judgments, forced choice*	In the past, writers often looked at collections of literary work for inspiration. **Context, event-biasing** Well-known writers usually owned collections of literary work to look at for reference. **Context, neutral** Larry owns many collections of Renaissance literature. **Context, constitutive-biasing** Shakespeare *began* the volume containing works of classic Renaissance comedies. **Target, aspectual verb** Shakespeare *enjoyed* the volume containing works of classic Greek comedies. **Target, psych verb**	Event-biasing+aspectual verb was rated higher than neutral+aspectual verb, psych verbs were rated higher than aspectual ones, event-biasing was rated higher than neutral; aspectual verbs were ambiguous between agentive and constitutive readings → **ambiguity resolution, not coercion**
Lapata et al. (2003) *sentence completion task*	Der Student/Kritiker began/probierte das Buch/den Brief... **Telic Subject** Der Autor/Lehrer began/probierte das Buch/den Brief... **Agentive Subject** Peter/Hans began/probierte das Buch/den Brief... **Neutral Subject**	Neutral and telic subjects biased towards telic completions, agentive subjects towards agentive ones. All verb + object combinations triggered varying reading preferences → **intra-sentential context influences complement coercion**

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Table 5.3 – *Continued from previous page*

Study	Stimuli		Results and conclusion
McElree, Pylkkänen, et al. (2006)			
speed-accuracy trade-off	The carpenter *began* the *table*.	**Acceptable, coercing, V–NP**	V–NP and NP–AP coerced expressions yielded lower asymptotic levels than controls. → **complement coercion costs**
	The carpenter *built* the *table*.	**Acceptable, control, V–NP**	
	The babysitter *comforted* the *child*.	**Acceptable, additional filler, V–NP**	
	The carpenter comforted *the table*.	**Unacceptable, matched to NP, V–NP**	
	The burglar *began* the moon.	**Unacceptable, matched to coercing, V–NP**	
	The hunter *built* the monsoon.	**Unacceptable, matched to control, V–NP**	
	The climber *imagined* the *ice* survivable.	**Acceptable, transitive, coerced, NP–AP**	
	The climber *imagined* the *fall* survivable.	**Acceptable, transitive, control, NP–AP**	
	The climber *proved* the *ice* survivable.	**Acceptable, s-clause, coerced, NP–AP**	
	The climber *proved* the *fall* survivable.	**Acceptable, s-clause, control, NP–AP**	
	The climber *imagined* the *acuity* survivable.	**Unacceptable, transitive, NP–AP**	
	The climber *proved* the *acuity* survivable.	**Unacceptable, s-clause, NP–AP**	
Raffray et al. (2014)			
Experiment 1 *reading; sentence completion task*	The celebrity *began* the + image of woman *drinking champagne*	**Coercing prime**	more coerced responses after reading coercing primes than event-NP ones, both more than after VP primes; more VP responses after VP primes than others → **complement coercion and syntactic priming**
	The celebrity *began* the + image of woman *giving an interview*	**Event-NP prime**	
	The celebrity *began drinking* the + image of woman *drinking champagne*	**VP prime**	
	The clerk began…+ image of clerk writing a note	**Target**	
Experiment 2 *listening, dialog; sentence completion task*	The celebrity *began* the + image of woman *drinking champagne*	**Coercing prime**	more coerced responses after coercing and event-NP primes vs. VP primes → **syntactic priming**
	The celebrity *began* the + image of woman *giving an interview*	**Event-NP prime**	
	The celebrity *began drinking* the + image of woman *drinking champagne*	**VP prime**	
	The clerk began…+ image of clerk writing a note	**Target**	

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Table 5.3 – *Continued from previous page*

Study	Stimuli	Results and conclusion
Experiment 3 *reading; sentence completion task*	The celebrity *began* the + image of woman drinking champagne **Coercing prime** The celebrity *began drinking* the + image of woman drinking champagne **VP prime** The clerk *began*...+ image of clerk writing a note **Same coercing verb target** The baker *finished*...+ image of baker baking a cake **Different coercing verb target**	more coerced responses after coercing primes than VP ones; more VP responses after VP primes than coercing ones → **complement coercion and syntactic priming**
Experiment 4 *listening, dialog; sentence completion task*	The celebrity *began* the champagne. + image of woman drinking champagne **Coercing prime, same predicate** The celebrity *began drinking* the champagne. + image of woman drinking champagne **VP prime, same predicate** The caretaker *began* the stairs. + image of man sweeping **Coercing prime, different predicate** The caretaker *began sweeping* the stairs. + image of man sweeping **VP prime, different predicate** The clerk began...+ image of clerk drinking **Target**	more coerced responses after coercing primes than VP ones; more VP responses after VP primes than coercing ones; more coerced responses after coercing, same predicate prime than after coercing, different predicate one → **complement coercion and syntactic priming**

In sum, coercion effects appear in a variety of experimental paradigms, from offline studies to brain imaging ones. Processing costs associated with coercion can be modulated by the context, as well as sentence boundaries, verb type, and experimental task. Coercion effects may be subtle in nature.

Complement coercion effects in processing are more robust than aspectual coercion ones. However, most studies on aspectual reinterpretation focus on iterative coercion. It is possible that different kinds of aspectual coercion vary with respect to processing. In contrast, underspecification is characterized by the absence of increased processing difficulty.

Crucially for the experiments on Sophia in the next chapters, coercion but not underspecification effects are visible in lower acceptability judgments, longer reading times, as well as more frequent regressions. In particular, agentive coercion bears similarities to additive coercion Bott (2010) and pragmatic enrichment of Frisson, Pickering, et al. (2011). Therefore, agentive coercion effects could be similar to the ones observed in those studies. Moreover, processing agentive coercion requires inferring an agent, which could further complicate the interpretation (Carpenter and Just 1977).

6

Being or Acting: Experiments 1 and 2

At long last, after diving into theories of copula predicate constructions and traversing the jungle of empirical studies, there is nothing standing in the way of experimenting on Sophia. Using two theories of agentivity in copula predicate constructions (the Underspecification Account and the Coercion Account) to predict reading differences between the state and event interpretations offers a glimpse into Sophia's internal friendliness and intelligence. This chapter presents two studies which examine Sophia's friendly exterior.

English agentive-stative alternations in (1) are manipulated through the progressive, which makes the agentive interpretations (1b) unambiguous at a glance. The interpretations in (1a) are not as clear cut. German, unlike English, lacks the progressive aspect. The state and activity readings in (1) appear the same on the surface (126). However, the same restrictions apply to the event readings in (126) as in (1b). The unavailability of an event interpretation can be probed, e.g. with adverbials such as *absichtlich* 'intentionally' or *freiwillig* 'voluntarily' (Brennenstuhl 1976).

The experiments conducted as part of this thesis exploited the opaqueness of interpretation in (126). Instead of disambiguating Sophia's intentions through the progressive or the lack thereof, the experiments relied on manipulating sentence material around a clause such as (126). The main clauses remained the same, so that the differences between stative and active friendliness could manifest during processing, for example in divergent reading behavior.

(1) a. Sophia is friendly/noisy/intelligent/retired.
    b. Sophia is being friendly/noisy/*intelligent/*retired.

(126) a. Sophia ist freundlich/laut/intelligent/emeritiert.
    b. Sophia ist absichtlich freundlich/laut/*intelligent/??emeritiert.

The core idea behind the Underspecification Account is that the copula's situational argument is underspecified until it combines with relevant sentence material (Rothstein 1999). Thus, the combination of the underspecified copula with either a stative or an eventive continuation should result in conflict-free composition. The Coercion Account proposes that the copula's situational argument is stative (Maienborn 2003b). The addition of stative sentence material will be straightforward, because it matches the copula's aspectual expectations. On the other hand, the combination with an eventive argument (or, in the case of (1), the progressive) will lead to a semantically defective representation. In this case, the interpretation could be repaired through agentive coercion. Both accounts make the same predictions about the semantics of copular sentences in German as in English (Maienborn 2003a; Rothstein 1999).

Some preparatory steps are in order before tackling the semantic contribution of the copula to the agentivity of a sentence head on. First, it is crucial to create adequate sentence material for any empirical study. Experiment 1 was an acceptability rating study which addressed this issue and laid the groundwork for Experiment 2 and the subsequent studies. Experiment 2 was an eye-tracking during reading study which attempted to probe underspecification and agentive coercion with fine-grained methods. All sentence materials, results files, and analysis scripts are available upon request from the Tübingen Archive of Language Resources (Experiment 1: `https://hdl.handle.net/11022/0000-0007-EB36-4`; Experiment 2: `https://hdl.handle.net/11022/0000-0007-EB39-1`). With that, Experiment 1 marks the start of the empirical search for the basis of Sophia's demeanor.

6.1 Experiment 1: Active Adjectives

The aim of this experiment was to develop adequate sentence material for contrasting Sophia's passive and deliberate friendliness. The first step in achieving this was to find a large sample of adjectives that permit both stative and agentive interpretations in copular sentences. To my knowledge, no such corpus exists in German. The adjectives assessed in this study would serve as the basis for item sentences in the subsequent experiments. In addition to testing the controllability of the adjectives, the goal was to determine which one of the German verbs is the likeliest equivalent to the English 'act': *sich verhalten* or *sich benehmen.* The verb that is judged most natural overall will be chosen for the following experiments.

6.1.1 Methods

Design

Experiment 1 was acceptability judgment study with a one factor mixed design. The within-item but between-subject factor was verb type (*sich verhalten* vs. *sich benehmen*). Adjectives were tested in combination with the verbs *sich verhalten* or *sich benehmen*, both of which translate roughly as 'to behave' or ‘to act’. Adjectives that are highly compatible with these verbs are ones where the subject can exert some form of volitional involvement or control over the event which they express. Therefore, they should be compatible with an agentive interpretation of the copula. Copular sentences were not tested, under the assumption that a sentence with a named subject, the copula and an adjective, such as (1a), would be rated at ceiling level of naturalness.

Due to the tortuously large number of sentences, the adjectives were tested between subjects. The adjectives were randomly assigned to one of two groups. Each group was then subdivided into two lists via the Latin square design. This resulted in four lists with 172 items each. Each participant saw all the adjectives from one group only once and with either *sich verhalten* or *sich benehmen*.

The lists were presented in one of two pseudorandomized orders so that there were at least three fillers between any two items. The orders were counterbalanced across lists and each list started with three filler sentences.

Materials

In order to obtain a sufficient number of adjectives, a random sample of 2000 sentences was extracted from the *Deutsches Referenzkorpus* (DeReKo) TAGGED-T corpus using the online interface COSMAS II (“Corpus Search, Management and Analysis System”; Bodmer Mory 2014; CoSMAS I/II 2008; Kupietz and Keibel 2009; Kupietz and Lüngen 2014; Kupietz, Lüngen, et al. 2018). The corpus was queried with the formula in (127), which in prose translates to searching for the sequence of a proper noun or personal pronoun followed directly by the copula, followed directly by an adjective.

(127) proper name OR masculine personal pronoun OR feminine personal pronoun \w+1 sein \w+1 adjective

As a result, 342 adjectives were chosen for this experiment; see Appendix B for a full list. Discarded adjectives included ones where the subject had no means of control over the predicate, for example *willkommen* ‘welcome’ or *gehasst* ‘hated’. Adjectives appearing in a sentence where the subject was an institution (e.g. *Sportverein* ‘sports club’) were excluded, unless they also appeared in sentences with animate subjects. The adjectives were not divided further into adjectival classes, because the majority expressed human propensities (e.g. *fröhlich* ‘happy’) and physical properties (e.g. *krank* ‘sick’). The remaining group included privative adjectives (e.g. *arbeitslos* ‘unemployed’), adjectives expressing age (e.g. *alt* ‘old’), value or appearance (e.g. *schön* ‘beautiful’), dimension (e.g. *groß* ‘big’), or affliction (e.g. *leseschwach* ‘reading impaired’); cf. Dixon (2004), Hundsnurscher and Splett (1982), and Kotowski (2016).

The item sentences consisted of a proper name, the verb *sich verhalten* or *sich benehmen* and an adjective, as illustrated in (128). One adjective erroneously appeared twice in the sentence material. Half of the names used in the experiment were female and the other half were male. The target items were supplemented by 546 filler sentences, which resembled the items

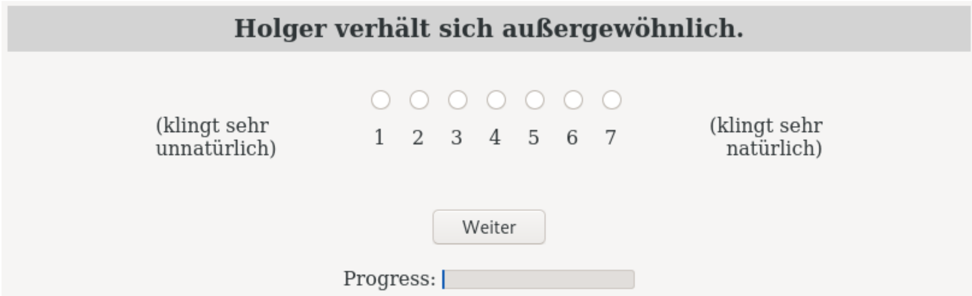


Figure 6.1: Stimuli presentation in Experiment 1.

in length but had different subjects. The fillers contained neither the critical verbs, nor any of the target adjectives. Of the fillers, 60% were natural and 40% contained semantic or world knowledge violations, e.g. (129a) and (129b), respectively. Of the sentences, 118 had female subjects and 119 had male subjects. The subjects of the remaining fillers were either group nouns (e.g. *die Inkas* 'the Incas'), inanimate objects (e.g. *der Käse* 'the cheese'), abstract objects (e.g. *die Zukunft* 'the future'), or institutions (e.g. *das Veterinäramt* 'the veterinary inspection office'). A large number of filler sentences was needed to distract the readers from the repetitive and formulaic target sentences.

(128) a. Katja verhält sich freundlich.
Katja behaves herself friendly
'Katja is behaving/behaves friendly.'

b. Katja benimmt sich freundlich.
Katja behaves herself friendly
'Katja is behaving/behaves friendly.'

(129) a. Die Katzenkinder suchen ein Zuhause.
the kittens are.looking a home
'The kittens are looking for a home.'

b. ??Das Mädchen wohnt auf der Pizza.
the girl lives on the pizza
'The girl lives on (top of) the pizza.'

Procedure

The experiment had the form of an online questionnaire and was programmed with OnExp ver. 1.2 (OnExp 2012). The participants could complete the questionnaire from their own computer over the internet.

Before the start of the experiment, participants were asked to answer general questions concerning their native languages, age, gender, handedness, and federal state of origin. Next, they read instructions detailing the experimental task and providing examples of an experimental trial. The participants were instructed to read the sentences and rate their naturalness on a seven-point Likert scale (Likert 1967) from 1 (*sehr unnatürlich* 'very unnatural') to 7 (*sehr natürlich* 'very natural'). Only one sentence was presented per slide. The sentences and the scale were presented simultaneously, as illustrated in Figure 6.1. The next trial was started by clicking on the *Weiter* 'onwards' button. At the start of the experiment, the participants trained on four exercise sentences (two natural and two anomalous ones).

The experiment was followed by an unrelated study. At the end of the second study, the participants read a short explanation of the purpose of each study. The whole experiment took 55 minutes on average (between 28 and 79 minutes).

Participants

40 native speakers of German, aged 19 to 44 (mean age 27, SD=5) were recruited for the experiment. 31 were women, 36 were right-handed, and 34 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Berlin, Hesse, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saxony, Schleswig-Holstein, and Thuringia.

The participants were randomly assigned to lists (10 participants per list, 20 participants per adjective). The participants who gave higher ratings to unnatural fillers than to natural fillers or had an average difference of ≤ 1 between the filler types were excluded from the analysis. This affected three participants. Due to a software error, the data from five other participants had to be discarded. New participants were recruited to fill in for the rejected ones. As compensation, the participants had a chance to win one of 12 Amazon vouchers worth 15 EUR each.

6.1.2 Analysis

The analysis was conducted in R (R Core Team 2021) and used the packages assertthat, backports, bayestestR, boot, broom, car, cli, colorspace, cowplot, crayon, DEoptimR, digest, dplyr, effectsize, ellipsis, emmeans, estimability, evaluate, fansi, farver, generics, ggforce, ggplot2, ggpubr, ggrepel, ggridges, ggsignif, glue, gridExtra, gtable, hms, htmltools, insight, knitr, labeling, languageR, lattice, lifecycle, lme4, lmerTest, magrittr, MASS, Matrix, mgcv, minqa, mnormt, munsell, mvtnorm, nlme, NLoptr, nnet, numDeriv, parameters, performance, pillar, pkgconfig, plyr, polyclip, psych, purrr, qqplotr, R6, Rcpp, readr, rlang, rmarkdown, robustbase, rstatix, rstudioapi, scales, see, statmod, tibble, tidyr, tidyselect, tmvnsim, tweenr, utf8, vctrs, withr, xfun, xtable, and yaml (Ahlmann-Eltze and Patil 2021; Allaire et al. 2021; A. Almeida et al. 2017; Auguie 2017; Azzalini and Genz 2020; Baayen and Shafaei-Bajestan 2019; Bache and H. Wickham 2014; Bates, Mächler, et al. 2015; Bates and Maechler 2021; Bates, Mullen, et al. 2014; Ben-Shachar et al. 2020; Bhattacjarjee 2016; Canty and Ripley 2021; Chang 2020; Cheng et al. 2021; Conceicao 2016; Csárdi 2019, 2021a,b; Dahl et al. 2019; Eddelbuettel 2020; Eddelbuettel and François 2011; Fox and Weisberg 2011; Gaslam 2021; Genz et al. 2020; Gilbert and Varadhan 2019; Giner and Smyth 2016; Henry and H. Wickham 2020a,b,c, 2021; Hester 2020; Hester et al. 2021; A.

Condition	Mean rating	SD	Min	Max
sich verhalten	3.70	2.25	1	7
sich benehmen	3.31	2.16	1	7
natural fillers	6.27	1.41	1	7
unnatural fillers	2.82	2.16	1	7

Table 6.1: Mean acceptability judgments for sentences in Experiment 1. SD = standard deviation.

Johnson and Adrian Baddeley 2019; S. G. Johnson 2021; Kassambara 2020, 2021; Kuznetsova et al. 2017; Lang and R Core Team 2020; Lenth 2018, 2020; Lüdecke, Ben-Shachar, Patil, et al. 2020; Lüdecke, Ben-Shachar, Waggoner, et al. 2020; Lüdecke, Makowski, et al. 2020; Lüdecke, Waggoner, et al. 2019; Maechler et al. 2021; Makowski et al. 2019; Müller 2021; Müller and H. Wickham 2021a,b; Pedersen 2018, 2020; Pedersen et al. 2020; Perry 2018; Pinheiro et al. 2021; Revelle 2020; Robinson et al. 2021; Sarkar 2008; Slowikowski 2021; Stephens et al. 2020; Talbot 2020; Ushey et al. 2020; Venables and Ripley 2002; C. Wickham 2018; H. Wickham 2011, 2016, 2019, 2020a,b; H. Wickham, François, et al. 2021; H. Wickham, Henry, et al. 2020; H. Wickham and Hester 2020; H. Wickham, Kuhn, et al. 2020; H. Wickham and Pedersen 2019; H. Wickham and Seidel 2020; H. Wickham and Xie 2019; Wilke 2020, 2021; Wood 2011; Xie 2021a,b; Zeileis et al. 2020), as were and did all the other experiments. For brevity, I list the packages only once here.

6.1.3 Results and Discussion

Sich verhalten had a mean rating of 3.7 and *sich benehmen* had a mean rating of 3.3 (see Table 6.1). The difference was significant ($t_1[39]=7.3$, $p<0.01$; $t_2[342]=8.9$, $p<0.01$). Some adjectives were rated higher with one verb than the other but given its high acceptability, *sich verhalten* is the superior candidate for comparisons with the copula.

Natural and unnatural fillers had a mean rating of 6.3 and 2.8, respectively. The study yielded a large group of adjectives rated for their naturalness in an agentive setting. The naturalness ratings formed a continuum from very low acceptability (e.g. *bleich* 'pale', mean rating 1.2) to very high acceptability (e.g. *professionell* 'professional', mean rating 6.5). The adjectives with highest ratings ($\geq$6) were: *merkwürdig* 'strange', *respektlos* 'disrespectful', *professionell* 'professional', *vorbildlich* 'exemplary', *kindisch* 'childish', *außergewöhnlich* 'unusual', *erwachsen* 'adult', *taktvoll* 'tactful', *loyal* 'loyal', *defensiv* 'defensive', and *vernünftig* 'reasonable'. The full list of adjectives and their ratings are provided in Appendix B.

As a result of the study, *sich verhalten* and 60 adjectives were chosen as a basis for future experiments. The process of adjective selection and the construction of item sentences is described in detail in Section 6.2.1 of this chapter. Having acquired adequate sentence material, we turn to our main focus: how easy is it for Sophia to be friendly?

6.2 Experiment 2: Reading Coercion

Experiment 2 was the first foray into the semantics of the copula and the intricacies of Sophia's behavior. The aim of this study was to determine whether the copula's situational argument is underspecified, or whether it is specified to a stative interpretation. Two theoretical approaches explain the agentive effects of how *Sophia is friendly/intelligent* differs from *Sophia is being friendly/*intelligent*: the Underspecification Account and the Coercion Account.

The Underspecification Account proposes an underspecified copula. The state and activity alternations in (1) are due to the adjective's properties and the utterance context. The interpretation is derived in two steps. First, an underspecified meaning representation is constructed. Second, gaps in the representation are filled in as appropriate. The interpretation of 'Sophia is friendly' is a state by default, although the activity interpretation is equally easy to derive.

The Coercion Account proposes a stative copula. The state interpretations in (1) are computed compositionally, whereas the activity ones are due to the resolution of a combinatorial conflict. The agentive interpretation is the product of coercing a complete state interpretation to an active one. Shifting an existing representation is an additional step in processing over incorporating fitting material, and thus ought to be visible in increased cognitive effort compared to the latter.

As mentioned above, German lacks the progressive aspect, which is key to distinguishing between (1a) and (1b). Therefore, the surface form of both active and passive friendliness are identical in German (126). However, combining the copula predicate construction with certain adverbials and conjunctions provides insight into the event and state interpretations. The present study exploited this sensitivity by combining a copular main clause with two kinds of conjunctions: the agentive conjunction *um... zu* 'in order to' and the stative or neutral one *weil* 'because'.

6.2.1 Methods

Design

In order to capture any subtle effects of agentive reinterpretation, the study used a fine-grained method of eye-tracking during reading. The experiment had a 2×2 design with the within-factors conjunction type (*um... zu* 'in order to' vs. *weil* 'because') and verb type (the copula *sein* vs. *sich verhalten* 'to behave'). An example item is presented in (130).

(130) a. Sophie war freundlich, und zwar um die Eltern stolz
Sophie was friendly and namely in.order the parents proud
auf sie zu machen.
of her to make
'Sophie was friendly, namely to make the parents proud of her.'

b. Sophie war freundlich, und zwar weil die Eltern sie
Sophie was friendly and namely because the parents her
gut erzogen haben.
good raised have

'Sophie was friendly, namely because the parents raised her well.'

c. Sophie verhielt sich freundlich, und zwar um die
Sophie behaved herself friendly and namely in.order the
Eltern stolz auf sie zu machen.
parents proud of her to make

'Sophie behaved friendly, namely to make the parents proud of her.'

d. Sophie verhielt sich freundlich, und zwar weil die
Sophie behaved herself friendly and namely because the
Eltern sie gut erzogen haben.
parents her good raised have

'Sophie behaved friendly, namely because the parents raised her well.'

The first factor probed the interpretation of the copular phrase. The conjunction *um… zu* 'in order to' necessarily enforces an agentive interpretation. Thus, the *um… zu* conjunction is only compatible with events (Breindl, Volodina, et al. 2014; Brennenstuhl 1976; Ehrenfellner 1996; Eisenberg et al. 2016). *Um… zu* typically introduces a final clause and expresses an intention, a goal, or an aim, as in (131), taken from Buscha (1989, p. 118). The intention is bound to the agent in the main clause, who is behaving in a particular fashion out of their own free will. In (131), the pupil is desperately trying to catch the tram, and in (130a)/(130c) Sophie is acting willingly and self-servingly, presumably to avoid a talking to.

Other uses of *um… zu*, such as (unreal) consecutive or copulative ones, are either marked syntactically by the presence of an additional *zu* 'too' or *genug* 'enough' in the main clause (as in (132)), or are rare. The temporal preposition interpretation (133), though frequent, would require *um* to be immediately followed by a time specification. In the experimental sentences this was blocked by the spillover area following the conjunction, e.g. *die Eltern* 'the parents' in the example (130).

Similarly, the prepositional use of *um* (*herum*) as 'around' (134) is also syntactically distinct. Prepositional uses such as in *die Zeit ist um* 'the time is up', *Schritt um Schritt* 'step by step' or *um Verständnis bitten* 'to ask for understanding' are either infrequent or strictly formulaic, making them unlikely if not impossible continuations for the main clauses of (130), and ruling them out by the spillover region. Lastly, the adverbial use of *um* 'around, circa' as in (135) has a different syntactic structure than the conjunctive one.

(131) Der Schüler rennt, um die Straßenbahn zu erreichen.
the pupil runs in.order the tram to reach

'The pupil is running in order to reach the tram.'

(132) Die Linguistin ist reich genug, um sich eine Yacht zu leisten.
the linguist is rich enough in.order herself a yacht to afford
'The linguist is rich enough to afford a yacht.'

(133) Die Reise startet um 12 Uhr.
the trip starts at 12 o'clock
'The trip starts at 12 o'clock.'

(134) Die Linguistin segelt um die Welt.
the linguist sails around the world
'The linguist sails/is sailing around the world.'

(135) Die Yacht kostet so um eine Million Euro.
the yacht costs so around one million Euro
'The yacht costs around one million Euro.'

Weil 'because' is drastically different from *um… zu* in respect to what it can combine with. It is the most frequent conjunction expressing a causal relation. The structure of causal *weil* sentences is straightforward. The consequence is asserted in the main clause, followed by the conjunction itself and the antecedence in the subordinate clause. The subordinate clause provides the reason for the consequence or fact presented in the main clause. It can express information which is known and new to the discourse (Breindl, Volodina, et al. 2014; Solstad and Bott 2017).

Although *weil* indicates a casual relation, it is underspecified with respect to the category of the relata (Blühdorn 2006, 2010a; Buscha 1989; Solstad 2010). These can be states (136a), propositions (136b), and pragmatic options (136c), among others (examples taken from Blühdorn (2010b, pp. 214–215)). Therefore, the easiest and default interpretation for *be* together with *weil* is that of a state. In (130), *weil* is compatible with both the copular main clause, irrespective of whether it is a state or an event, and the verb 'to act'.

(136) a. Es wird bestimmt bald kühler, weil schon Oktober ist.
it will.be certainly soon colder because already October is
'It will certainly be colder soon, because it's already October.'

b. Der Streit bricht aus, weil einer der Jugendlichen ein Messer zückt.
the fight breaks out because one of.the youths a knife draw
'The fight is breaking out because one of the youths drew a knife.'

c. Habt ihr schon Feierabend? Weil hier alles dunkel ist.
have you already closing.time because here all dark is
'Are you closing already? Because everything is dark here.'

In sum, in the absence of a progressive aspect, using conjunctions which introduce drastically different subordinate clauses provides insight into the semantics of the main clause. A subordinate clause introduced by *weil* should be compatible with a stative and an underspecified copular main clause. Crucially, a subordinate clause introduced by *um… zu* is only compatible with an eventive main clause, which can accommodate agentivity. If the main clause is stative, a continuation with *um... zu* will cause a semantic mismatch. This minimal pair permits insight into the semantics of the copular main clause.

The second factor, verb type, specifically the inclusion of *sich verhalten* 'to behave' is important for several reasons.[1] The argument expectations of this verb are known, unlike the copula's. *Sich verhalten* requires an event as its argument, therefore the interpretation of the main clause will be an agentive one. This reading persists until the end of the sentence, irrespective of whether the conjunction in the subordinate clause is *um... zu* or *weil*. *Um... zu* has an agentive interpretation which is compatible with *sich verhalten*. *Weil* is flexible in that respect and adopts an agentive reading in combination with *sich verhalten*.

If there is a difference between *um... zu* and *weil* in sentences with *sich verhalten*, then it is not due to an agentive reinterpretation, but instead due to confounding variables such as the differences in word length between the conjunctions. For example, *um... zu* is short enough to potentially be skipped altogether, which could manifest in reading differences. Comparing reading behavior in sentences with a verb such as *sich verhalten* (with known situational arguments) in combination with the conjunctions to sentences with the copula removes the variation stemming from word length and other confounding variables.

One way of removing differences unrelated to the active-stative distinction is exemplified in (137) for reading times. Subtracting the mean reading times on *um... zu* ($RT_{verhalten+um}$) from the reading times on *weil* ($RT_{verhalten+weil}$) in sentences with *sich verhalten* reveals the reading differences which are due to word length. This mean difference can then be subtracted from the reading time on *weil* in sentences with the copula ($RT_{copula+weil}$), thereby arriving at an adjusted reading time ($RT'_{copula+weil}$). This new reading time serves as the comparison for copular sentences with *um... zu*. Any effects observed after the exclusion of the word length difference will be caused by the interpretational operations (I thank Prof. Dr. Shravan Vasisht for this suggestion).

(137) $RT'_{copula+weil} = RT_{copula+weil} - (RT_{verhalten+weil} - RT_{verhalten+um})$

Materials

60 items in four conditions and 246 fillers were distributed over four lists in a Latin square design. The lists were pseudorandomized in two counterbalanced orders, so that there were at least two filler conditions between any two items and no two adjacent items were in the same condition. Each participant saw the items only once with alternating conditions. All sentences were in preterite tense. A full list of experimental items is in Appendix C.

The item sentences consisted of a main clause followed by a subordinate clause. The main clauses were adapted from the acceptability study in Experiment 1. Only adjectives that were compatible with *sich verhalten* with

[1] The second reason, which was later abandoned, was to compare the copula to *sich verhalten* in conditions with the agentive conjunction, under the assumption that both mean 'to act'.

a mean rating over 4.0 (mean=4.8, SD=0.7) and a length of 6 to 11 letters (mean=8.9, SD=1.3) were retained. The most frequently used German names were chosen for the new items. 30 were female and they had a mean length of 5.3 characters (SD=0.7, min=4, max=6).

The conjunction, flanked by two buffer regions, followed the main clause. The first buffer region, the preview, was always *und zwar* ('(and) namely'). *Und zwar* is a meta-communicative connector that relates to the discourse at large and not the individual sentence elements (Breindl, Volodina, et al. 2014). By using *und zwar*, the speaker expresses the idead that they will specify an explicit or implicit piece of information. The initial part of the sentence which precedes *und zwar* withholds some information, which is supplemented in the sentence fragment following it. This division establishes a temporal hierarchy between both sentence parts and presents the information in a coherent and more reader-friendly manner (Faulstich 2013). Importantly, *und zwar* was chosen because it should not interfere with the aspectual properties of the sentence.

The spillover region was the same across all conditions of an item, e.g. *die Erzieher* 'the educators' or *die Eltern* 'the parents' as in (130). This was to ensure that if the conjunctions were skipped, any effects potentially emerging on the conjunction area could be measured here as well. The spillovers had a mean length of 11.8 letters (SD=2.8, range 5–21).

The final region contained the end of the sentence, which differed between the conjunctions due to syntactic reasons resulting from the grammar of the different conjunctions; see (130a)/(130c) and (130b)/(130d). This interest area had a mean length of 18.8 letters (SD=5, range 9–32). The syntactic differences and the possibility of sentence wrap-up effects made it unsuitable for finding any interpretable effects.

The entire sentences had an average length of 71.8 letters (SD=7.5, range 54–87). Conditions with *um… zu* had a mean length 18.4 letters (SD=5.2, range 9–32), and conditions with *weil* had a mean length 19.3 letters (SD=4.7, range 9–29).

The new fillers were constructed on the basis of the natural fillers from the previous experiment (mean rating $\geq$4.0). Overall, 80% of all experimental sentences were fillers. The distractor stimuli had to be matched in length and sentence structure to the items. The filler sentences had a mean length of 75.4 letters (SD=14.8, range 47–109). The main clauses had a mean length of 33.6 letters (SD=9.4, range 11–59) and the subordinate clauses had a mean length of 37.8 letters (SD=10.7, range 14–71).

Instead of *um… zu* and *weil*, the subordinate clauses were headed by *aber* ('but', 52 sentences), *bevor* ('before', 45 sentences), *nachdem* ('after', 48 sentences), *während* ('while', 50 sentences), *wobei* ('when', 52 sentences). 61 fillers contained female subjects in the main clause, 61 contained male subjects and the remaining fillers had other subjects, such as *das Parlament* 'the parliament', *Kormorane* 'cormorants', or *die Inkas* 'the Incas'. The names in the items were not repeated in the fillers and in total, 47% of all experimental sentences had named subjects.

The sentences were divided into invisible interest areas as indicated by

IA 1	IA 2	IA 3	*IA 4*	*IA 5*	*IA 6*	IA 7
Name	verb	adjective	*preview*	*conjunction*	*spillover*	sentence end.

Table 6.2: Item segmentation into invisible interest areas (IAs) in Experiment 2. Critical IAs are marked in cursive.

vertical lines in Table 6.2. The sentence material after the conjunction was divided into two areas, so that the first segment (e.g. *die Eltern* 'the parents' in (130)) was identical across conditions, despite the last segment being different (e.g. *stolz auf sie zu machen* 'make proud of her' vs. *sie gut erzogen haben* 'raised her well').

One third of all sentences in the experiment was followed by a simple comprehension question, such as (138), which followed (130). A third of the questions followed an item; two thirds followed a filler sentence. In half of the questions the correct answer was presented on the right and in the other half on the left. This order was counterbalanced across the lists. The questions targeted the main and subordinate clauses equally frequently to ensure that participants read the entire sentence carefully.

(138) Wer oder was wurde im Satz erwähnt?
who or what was in.the sentence mentioned
'Who or what was mentioned in the sentence?'

Die Eltern / Die Geschwister
the parents / the siblings

Predictions

The predictions of the Underspecification Account and the Coercion Account are summarized in Table 6.3. According to the Underspecification Account, the copula is underspecified in (130a) and (130b) at least up to the end of the main clause. In both of these sentences, the continuations are incorporated with equal ease through composition, irrespective of their contribution to an agentive interpretation. The verb *sich verhalten* is lexically specified and expects event-compatible arguments. It combines effortlessly with a continuation that is congruent with an event interpretation, as in (130c). The flexibility of the conjunction *weil* in (130d) allows it to be integrated straightforwardly, without the need for reinterpretation. Overall, the Underspecification Account predicts no processing differences between (130a) and (130b) in either of the critical interest areas. Furthermore, there should not be any differences between (130c) and (130d) stemming from the experimental manipulation.

According to the Coercion Account, the copula is specified to have a stative interpretation up until the conjunction interest area. *Um... zu* in (130a) enforces an agentive reinterpretation, which leads to increased processing effort needed to accommodate the conflict. This is not the case in (130b), where the integration is straightforward and compositional. The verb *sich verhalten* is specified to have an event interpretation. It combines effortlessly

Verb	Conjunction	Underspecification	Coercion
war	um… zu	✓	✗
war	weil	✓	✓
verhielt sich	um… zu	✓	✓
verhielt sich	weil	✓	✓

Table 6.3: Predictions for processing difficulty in Experiment 2 made by the Underspecification Account and the Coercion Account. ✓= no conflict, composition; ✗= conflict, reinterpretation.

both with a continuation that is congruent with an event interpretation, as in (130c), as well as a flexible one, as in (130d). In sum, the Coercion Account predicts that (130a) will be more difficult than (130b), i.e. there should be an interaction between the verb type and the conjunction on the preview, the conjunction, or the spillover interest areas. Reading behavior related to the experimental factors should be identical in (130c) and (130d).

If the assumptions of the Coercion Account are correct, processing delays caused by coercion would most likely appear in first fixation duration, first pass regressions, and second pass reading times, though the analysis of first pass reading time and regression path duration could be instructive. Such findings would be consistent with the effects reported in other eye-tracking studies on aspectual coercion. Based on the findings of experimental studies summarized in Chapter 5, the repair mechanism should be incremental. The conjunctions will be interpreted on the fly and the effects should be visible before the reading of the entire sentence is finished (Bott 2010; Koornneef and van Berkum 2006; Pyykkönen and Järvikivi 2010).

Participants

40 native speakers of German, aged 18 to 30 (mean age 24, SD=3), were recruited for the experiment. 30 were women, 34 were right-handed, and all were monolingual German native speakers. Participants came from the following federals states: Baden-Württemberg, Bavaria, Brandenburg, Hesse, Lower Saxony, Rhineland-Palatinate, Saxony, and Schleswig-Holstein. The participants were randomly assigned to lists (10 participants per list).

The participants had normal or corrected to normal vision. They were naïve to the purpose of the study and had not participated in Experiment 1. The participants received 10 EUR as compensation. The mean correct answer rate to the comprehension questions was 98% (range 92.3% to 99%, SD=1.2%). Furthermore, only data from participants who were native speakers of German and successfully completed both the eye-tracking and the reading span task were used in the analysis. This led to the exclusion of three participants, who were subsequently replaced.

Procedure

The experiment was conducted in a quiet experimental room with an SR Research Eye-Link 1000 eye-tracker desktop mount with a 35 mm lens, 13

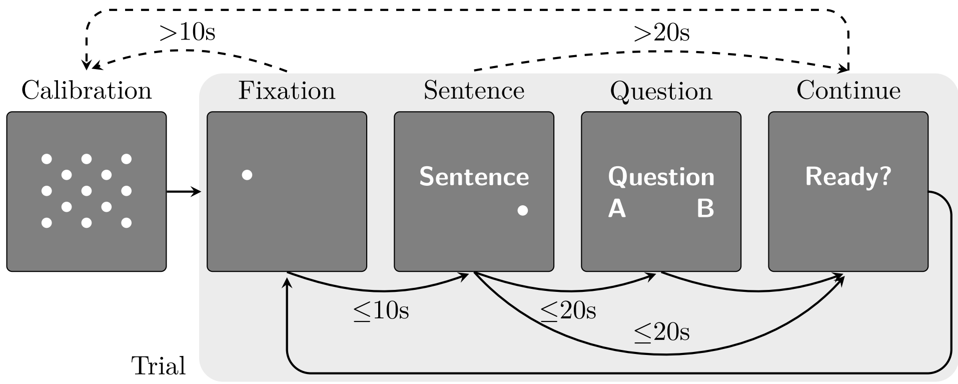


Figure 6.2: Trial structure in Experiment 2. Solid lines indicate regular procedure, dashes lines indicate the procedure in the case of calibration loss. A singular trial is marked in light gray.

point calibration, and 1k sample rate and pacing interval. A game pad and a keyboard were used to navigate the experiment. Participants viewed the stimuli on a 21 in monitor 70 cm away from their eyes. They were instructed to blink normally but to refrain from moving their heads. The experiment was programmed using SR Research Experiment Builder software and the data was imported and preprocessed using the SR Research EyeLink Data Viewer. Viewing was binocular but only the dominant eye was tracked, as determined prior to the experiment through the Miles method (Miles 1930) (right eye for 21 participants).

Before the start of the experiment, participants were asked to fill in general questions concerning their native languages, age, gender, handedness, dominant eye, and federal state of origin. Next, they read instructions detailing the experimental task and giving examples of an experimental trial. The participants were encouraged to ask clarification questions and, after completing the experiment, were informed about the purpose of the study.

The experiment was preceded by nine exercise trials. The experimental session included a break in the middle of the experiment and the participants were encouraged to take additional breaks as needed. The first three sentences at the start of the experiment and after the scheduled break were fillers. The eye-tracker was recalibrated before the exercise, before the experiment, and after breaks. The trial procedure is illustrated in Figure 6.2. Every trial was preceded by a drift correction screen, which checked whether a new calibration was necessary. The participants were instructed to look at a fixation point (a white dot) on a gray background. If the participants failed to fixate on the point within 10 seconds, a calibration procedure was enforced. Once the participants fixated on thatpoint for 1 second, the sentence appeared. The first letter of the first word in the sentence was centered on the position of the fixation point on the previous screen. This prevented the participants from making unnecessary eye movements. The sentence was presented written in white letters on a dark gray background in Lucida Sans Unicode font size 20 pt. Two characters corresponded roughly to 1 degree of visual angle.

After they finished reading the sentence, the participants were instructed to fixate on a white dot in the lower right corner of the screen for 1 second. If the participants read for longer than 20 seconds or failed to fixate on the white dot within that time, another calibration procedure was enforced. This second drift correction ensured that any loss of calibration during sentence reading could be corrected before the next trial.

The sentence presentation was occasionally followed by the question display. The participants used a game pad to answer the questions. Feedback was provided in the practice trials, but not in the experimental trials. The participants had unlimited time to answer the questions, but the average answer time was 14 seconds (SD=3 seconds). The experiment took about an hour on average (between 45 and 70 minutes). After completing the eye-tracking part of the experiment, the participants performed a reading span task based on Rummel et al. (2017).

Reading span task

The participants' working memory was measured to control for individual differences in reading comprehension and information processing. The reading span task was programmed using E-Prime software from Psychological Software Tools Inc. and downloaded from the website of the Attention & Working Memory Lab at the Georgia Institute of Technology.[2]

Recording the participant's reading span should be insightful, because those with a higher reading span may have an easier time repairing a defective meaning representation. It has been long established that language comprehension is connected to the individual's working memory capacity, vocabulary, and a general lexical access process. The reading span task is a good way of measuring a participant's verbal working memory (Alan Baddeley et al. 1985; Conway et al. 2005; Daneman and Carpenter 1980; Friedman and Miyake 2004). Working memory capacity has been also shown to be related to an individual's intelligence, emotion regulation, reasoning, comprehension under adverse conditions, multitasking, and problem solving (Carroll et al. 2015; Hambrick et al. 2009; Kleider et al. 2009, among others).

Analysis

The data was preprocessed with the SR Research EyeLink Data Viewer. The statistical analyses were logit mixed effect models for reading and fixation times and generalized linear mixed effect models for regression proportions. Fixed factors were verb type and conjunction type, and the random factors were item number and participant ID. The data analysis was conducted in R (R Core Team 2021).

Trials with tracking loss were removed before the analysis. Fixations outside of an interest area were included if they were within 1 degree of visual angle of an interest area. Fixations immediately preceding or following

[2]The newest version of the reading span task can be found on the institute's website: `http://englelab.gatech.edu/translatedtasks.html`, last accessed July 5, 2018.

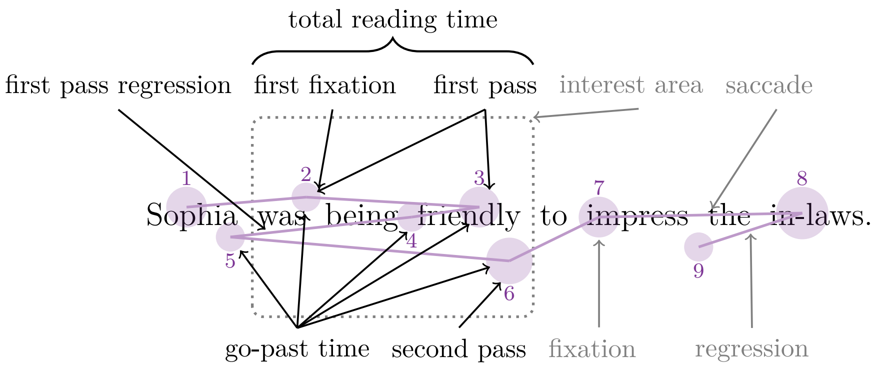


Figure 6.3: Overview of common eye tracking measures. Numbers indicate the order of fixations and circle size indicate the relative fixation duration.

a blink were removed. Fixations shorter than 80 ms were combined with another fixation if they were within one character space from each other. Lastly, the remaining fixations which were shorter than 80 ms or longer than 1400 ms were removed before the analysis. In total, 1.8% of the fixations were merged and 1.8% were removed. Reading times or fixation that were extraordinarily longer than the average were also removed. This affected 0.03% of the data.

Very short fixations are often the result of false saccade planning and not meaningful information processing (Rayner and Pollatsek 1989). Similarly, exceedingly long fixations are unlikely to be due to interpretation, but rather due to the participant being distracted or doing something unrelated to the experiment task.

Reading times and fixation durations were log-transformed before the analysis. Three critical interest areas were analyzed: the preview *und zwar*, the conjunction, and the spillover (see Table 6.2). The conjunction was the critical interest area where processing difficulties were triggered and expected to emerge. The conjunctions were short and their areas small, therefore they fell within the preview of the neighboring interest areas. The analysis of the spillover and the preview areas ensured that any effects that might be due to coercion were not missed due to skipping or delay.

Only those measures were used which were recorded before the entire sentence was read. The sentences differed between conditions with *um... zu* and *weil* due to syntactic constraints and the divergent continuations could have impacted re-reading. The following measures were analyzed: (i) first fixation duration; (ii) first pass duration; (iii) first pass regression; (iv) second pass duration; (v) regression path duration. An overview of these measures in depicted in Figure 6.3. For an in-depth explanation of each of these measures, see Chapter 5.

First fixation duration is the length of the first fixation to fall inside of the interest area. *First pass duration* (or “first run dwell time”) is the sum of all the fixations within an interest area, from the first fixation in that interest area until the first time a fixation falls outside the interest area. *Second pass* *duration* is the duration of re-reading an interest area after first pass reading. *First pass regressions* out of an interest area measure whether the participant saccaded out of the interest area into an interest area earlier in the sentence during first pass reading. *Regression path duration* (or "go-past time") is the sum of all fixations from the first fixation into that interest area until the reader moves to the right past the interest area, i.e. reads the next interest area.

First fixation duration and first pass reading time are typically assumed to measure early stages of language processing (e.g. lexical processing, word length). First pass regression rates are also an early measure, as frequent regressions indicate difficulty in word recognition and integration. Regression path duration is by some considered to be an early measure, while others hold it to be a late one (Liversedge et al. 2011). It is associated with text processing. Second pass reading times are a later measure, reflecting processes of integration at sentence level.

As noted before, the reading and fixation measures between the conjunction in conditions with *sich verhalten* were used to correct for word length differences, as in (137). The first pass reading times and first fixation durations on the conjunction interest area were adjusted per participant according to the template in (137). The average difference was 17.6 ms for first pass duration and 7.5 ms for first fixation duration.

6.2.2 Results

All significant effects within the target interest areas are reported. Descriptive statistics are summarized in Table 6.4 and inferential statistics in Table 6.5. Reading times and regressions are illustrated in Figure 6.4.

First pass duration: There was a main effect of verb type on the conjunction interest area. Copular sentences elicited longer reading times than sentences with *verhielt sich*. The interaction between verb type and conjunction type on this interest area was also significant. Planned comparisons revealed that sentences with *verhielt sich* in combination with *weil* were read longer than when combined with *um... zu* ($t_1[39]=-2.34$, $p<0.05$, 95% CI: -28.27, -2.05; $t_2[59]=-3.33$, $p<0.01$, 95% CI: -31.80, -7.95). A main effect of conjunction type was visible on the subsequent spillover interest area. Sentences with *weil* caused longer reading times than those with *um... zu*.

First fixation duration: The analysis of the conjunction interest area revealed a main effect of verb type and an interaction between the factors. These effects were analogous to the findings in first pass duration. Copular sentences were fixated for longer than sentences with *verhielt sich*. Planned comparisons revealed that sentences with *verhielt sich* in combination with *weil* were read longer than when combined with *um... zu* ($t_1[39]=-2.19$, $p<0.05$, 95% CI: -21.47, -0.83; $t_2[59]=-2.41$, $p<0.05$, 95% CI: -23.36, -2.17).

Regression path duration: There were two main effects in go-past times on the conjunction and spillover interest areas. Copular sentences triggered longer reading times than sentences with *sich verhalten* and *weil* elicited longer go-past times than *um... zu*.

First pass regression ratios: Um... zu elicited marginally more regressions than *weil* on the preview interest area. This main effect was due to the differences between conjunctions in copular sentences. Readers launched more regressions when reading copular sentences with *um... zu* than with *weil* (t_1[39]=2.39, $p<0.05$, 95% CI: 0.00, 0.05; t_2[59]=2.31, $p<0.05$, 95% CI: 0.00, 0.05). This pattern was reversed on the next two interest areas. *Weil* triggered more regressions than *um... zu*. However, planned comparisons revealed that within the *verhielt sich* conditions, the difference between the conjunctions was marginal at best (IA5: t_1[39]=−1.66, p=0.10, 95% CI −0.10, 0.01, t_2[59]=−2.13, $p<0.05$, 95% CI −0.10, −0.00; IA6: t_1[39]=−0.75, p=0.46, 95% CI −0.04, 0.02, t_2[59]=−0.66, p=0.51, 95% CI −0.04, 0.02).

Reading span task: The mean accuracy on the reading span task was 96.9% (min=90%, max=100%). The mean partial reading span score was 57.7 (SD=9.6, min=32, max=73). The participants were divided into two groups based on their reading span score: lower reading span group ≤ 60, and high reading span group > 60 (22 and 18 participants, respectively). There was an interaction between verb type and reading span on the conjunction interest area (β=−0.31, SE=0.14, t[132]=−2.20, $p<0.03$, 95% CI: −0.58, −0.04). Numerically, the participants in the lower reading span group re-read the copular sentences faster than the higher reading span group (211 vs. 242 ms), but the difference was not significant in pairwise comparisons.

6.2.3 Discussion

The results obtained in Experiment 2 are far from expected. Although the Underspecification Account predicted no differences between the conjunctions, there were multiple instances where regression proportions, reading times, and fixation times diverged. Furthermore, the predictions of the Coercion Account were not met except for a marginal effect in first pass regressions from the preview interest area.[3]

Overall, the findings provide some support for the Coercion Account, whereas the predictions of the Underspecification Account are unconfirmed. The default interpretation of the copular verbal phrase is stative. The addition of the agentivity introducing conjunction *um... zu* causes increased cognitive effort, which is necessary in order to achieve an agentive interpretation of the copula.

Agentive coercion appeared in first pass regression proportions, which is an early measure, reflecting word recognition and integration. This suggests that the stative copular phrase is reinterpreted as active as soon as the mismatching conjunction is encountered. Aspectual coercion costs have previously been observed in proportions of first pass regressions (e.g. Bott 2017; Frisson, Pickering, et al. 2011), which is indicative of this measure's sensitivity to aspectual reinterpretations.

[3] See Chapter 10 for a discussion on the strength and reliability of the effects.

IA	Verb	Conjunction	Mean (SD)	Min	Max
First pass duration					
5	war	um... zu	244.28 (106.29)	23	796
5	war	weil	231.42 (89.34)	86	731
5	verhielt sich	um... zu	211.92 (74.34)	81	711
5	verhielt sich	weil	229.54 (85.14)	86	764
6	war	um... zu	321.96 (157.24)	84	1252
6	war	weil	332.50 (172.97)	91	1167
6	verhielt sich	um... zu	313.63 (162.98)	81	1283
6	verhielt sich	weil	331.45 (175.23)	81	1317
First fixation duration					
5	war	um... zu	228.80 (81.19)	57	636
5	war	weil	219.34 (67.84)	86	550
5	verhielt sich	um... zu	207.76 (61.93)	81	449
5	verhielt sich	weil	219.82 (71.78)	86	583
Regression path duration					
5	war	um... zu	249.56 (113.66)	107	837
5	war	weil	261.22 (134.81)	86	926
5	verhielt sich	um... zu	223.38 (91.40)	81	774
5	verhielt sich	weil	256.03 (117.27)	86	765
6	war	um... zu	365.88 (218.77)	84	1887
6	war	weil	393.37 (256.81)	91	2210
6	verhielt sich	um... zu	356.73 (225.51)	81	1884
6	verhielt sich	weil	382.41 (249.82)	81	1887
First pass regression ratios					
4	war	um... zu	0.06 (0.24)	0	1
4	war	weil	0.03 (0.17)	0	1
4	verhielt sich	um... zu	0.04 (0.20)	0	1
4	verhielt sich	weil	0.04 (0.19)	0	1
5	war	um... zu	0.08 (0.27)	0	1
5	war	weil	0.09 (0.29)	0	1
5	verhielt sich	um... zu	0.05 (0.21)	0	1
5	verhielt sich	weil	0.10 (0.30)	0	1
6	war	um... zu	0.08 (0.27)	0	1
6	war	weil	0.11 (0.31)	0	1
6	verhielt sich	um... zu	0.08 (0.27)	0	1
6	verhielt sich	weil	0.09 (0.28)	0	1

Table 6.4: Mean differences between conditions in Experiment 2. Durations are in ms, first fixation durations and first pass reading times are adjusted for conjunction length (which is why the durations may be shorter than the 80 ms cutoff point). IA = interest area; SD = standard deviation.

IA	Variable	Est.	SE	df	t/z	p≤	95% CI
First pass duration							
5	(intercept)	5.36	0.03	41	167.37	0.00	5.30, 5.43
5	verb	0.06	0.02	1102	3.42	0.00	0.02, 0.09
5	verb×conjunction	−0.08	0.03	1098	−2.42	0.02	−0.15, −0.02
6	(intercept)	5.66	0.04	61	141.63	0.00	5.58, 5.74
6	conjunction	0.04	0.02	2171	2.41	0.02	0.01, 0.07
First fixation duration							
5	(intercept)	5.34	0.03	41	187.67	0.00	5.28, 5.39
5	verb	0.04	0.01	1097	2.85	0.00	0.01, 0.07
5	verb×conjunction	−0.06	0.03	1094	−1.97	0.05	−0.12, 0.00
Regression path duration							
5	(intercept)	5.43	0.03	39	163.36	0.00	5.36, 5.49
5	conjunction	0.07	0.02	1104	3.70	0.00	0.03, 0.11
5	verb	0.04	0.02	1111	2.24	0.05	0.01, 0.08
6	(intercept)	5.76	0.05	61	127.37	0.00	5.67, 5.85
6	conjunction	0.06	0.02	2173	3.03	0.00	0.02, 0.09
6	verb	0.03	0.02	2173	1.65	0.10	−0.01, 0.07
First pass regression ratios							
4	(intercept)	−3.42	0.19		−17.55	0.00	−4.10, −2.98
4	conjunction	−0.44	0.23		−1.92	0.05	−0.50, 0.77
5	(intercept)	−2.87	0.24		−11.75	0.00	−3.17, −2.03
5	conjunction	0.54	0.24		2.22	0.03	−1.58, −0.14
6	(intercept)	−2.75	0.19		−14.27	0.00	−3.24, −2.32
6	conjunction	0.25	0.15		1.65	0.10	−0.58, 0.29

Table 6.5: Significant effects found in Experiment 2. Logit mixed-effect model for regression ratios, linear mixed-effect models otherwise. CI = confidence interval; df = degrees of freedom; Est. = estimate; IA = interest area; SE = standard error.

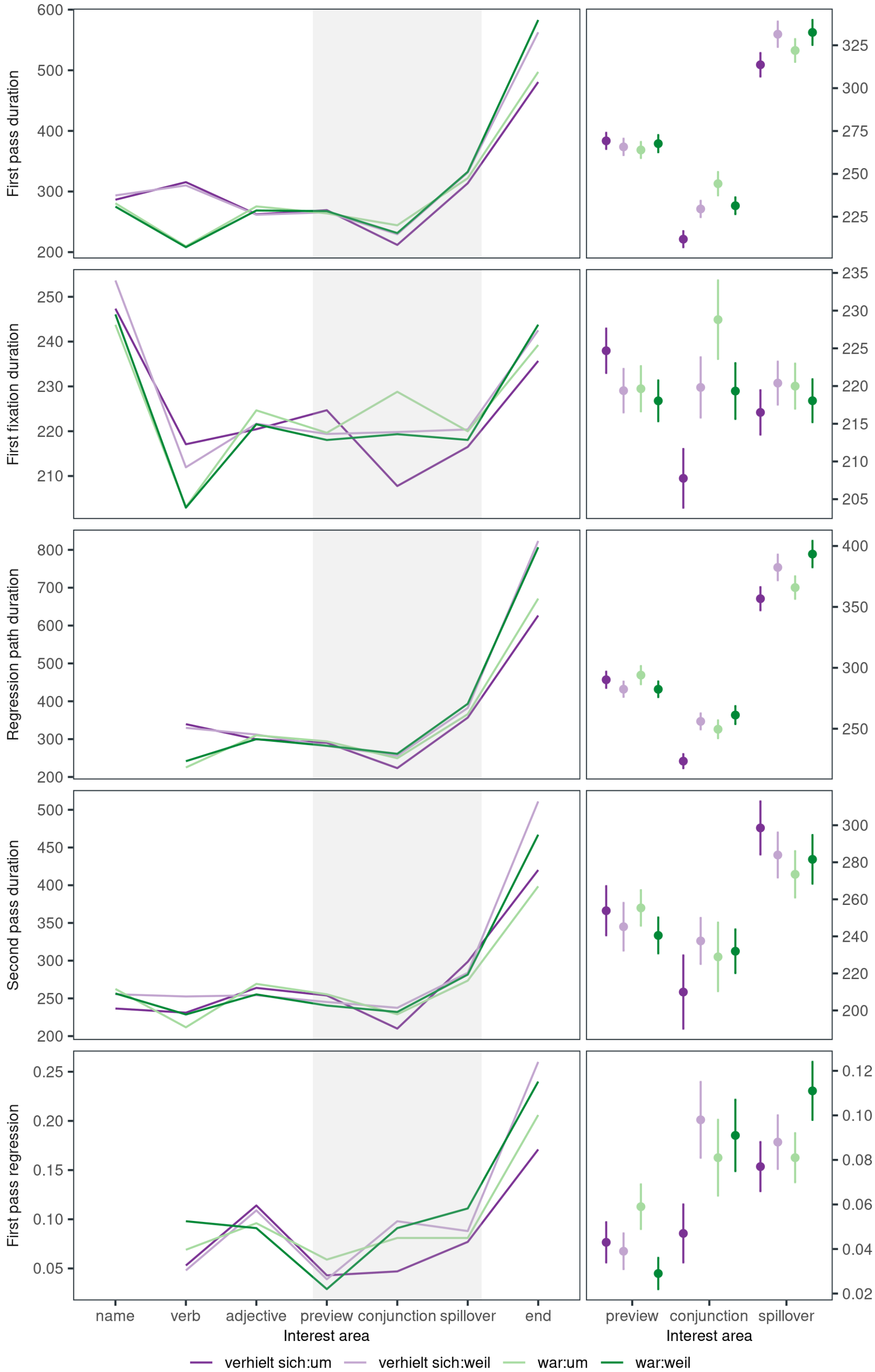


Figure 6.4: Results of Experiment 2. Durations were adjusted for word length, but regression proportions were not. Error bars are standard errors of the mean and target interest areas are marked in gray.

6.3 General Discussion

This chapter presented two studies aimed at determining whether Sophia is friendly by nature or due to calculated behavior. Experiment 1 established a database of adjectives which can be interpreted in an agentive fashion. Experiment 2 contrasted two theoretical approaches to agentivity in copular sentences: the Underspecification Account and the Coercion Account.

The findings of Experiment 1 show in a large sample of adjectives that agentivity forms a continuum from easily controlled actions to insuppressible ones. This finding indicates that the division between stage-level and individual-level predicates outlined in Chapter 2 is not as clear cut as it may seem.

Experiment 2 provided some evidence for the copula's inherent stativity, in line with the predictions of the Coercion Account. Sophia is effortlessly friendly and inherently intelligent.

Aspectual coercion is elusive in empirical studies, therefore finding only marginal effects is not surprising, if somewhat disappointing. However, first pass regression ratios have been shown to reflect aspectual coercion costs. Nevertheless, further work is necessary before we can confidently rule in favor of the Coercion Account. The next chapter addresses one issue that may have impacted the results of Experiment 2 and attempts to replicate them.

7 Coercion or Expectation: Experiments 3, 4, and 5

Experiment 2 showed marginal coercion effects in sentences where Sophia was expected to act a certain way. This suggests that Sophia is friendly by character and taking charge of her behavior is something that catches attention. However, one issue emerged as a result of the previous study: the control sentences' naturalness was somewhat undetermined. There may be a difference in acceptability between the agentive conjunction *um... zu* 'in order to' and the neutral conjunction *weil* 'because' when they are combined with the verb *sich verhalten* 'to behave'. If the former is more natural or frequent than the latter, then the differences in reading behavior could result from differences in plausibility or expectation. Such a finding would undermine the results of Experiment 2. The effect interpreted in favor of coercion would instead be a by-product of the expectation of what conjunction is likely to follow the verb.

A cursory glance at how often these conjunctions appear with *sich verhalten* in corpora offers some insight into the issue. Table 7.1 summarizes the frequencies of occurrence of both conjunctions with the verbal uses of *sich verhalten* in the *Deutsches Referenzkorpus* W archives (DeReKo, accessed via COSMAS II, Version 2.3.5; Bodmer Mory 2014; CoSMAS I/II 2008; Kupietz and Keibel 2009; Kupietz and Lüngen 2014; Kupietz, Lüngen, et al. 2018). The search phrases used for retrieving their occurrences are spelled out in (139a) and (139b) for *weil* and *um... zu*, respectively. In prose, (139a) queries the corpus for sentences which contain a form of the verb *sich verhalten* followed by the conjunction *weil*. Similarly, (139b) searches for the sequence of the verb *sich verhalten* followed by *um* followed by *zu* within one sentence.

(139) a. &verhalten /+s0 weil

b. &verhalten /+s0 um /+s0 zu

	W	W2	W3	W4	W-Total w/verhalten	T-Total
um... zu	2667	2553	2136	2363	9719 (59%)	430188 (46%)
weil	2251	1734	1224	1422	6631 (41%)	513325 (54%)
difference	416	819	912	941	3088 (19%)	83137 (9%)

Table 7.1: Frequency of *sich verhalten* with conjunctions in the *Deutsches Referenzkorpus* W archives and total number occurrences of the conjunctions in TAGGED-T corpora.

Sich verhalten was more likely to appear in the sentence with *um... zu* than with *weil*, despite the fact that the latter occurred more frequently than the former in the DeReKo TAGGED-T corpus (see Table 7.1). This finding raises a methodological concern. The previous experiments and prospective studies would benefit of determining the naturalness of the sentences between conditions.

The following three studies addressed this issue. Experiment 3 investigated the plausibility of the sentence material, Experiment 4 explored alternative control conditions, and Experiment 5 attempted to do away with the control conditions. All sentence materials, results, and analysis files are available upon request fromr the Tübingen Archive of Language Resources (Experiment 3: `https://hdl.handle.net/11022/0000-0007-EB37-3`; Experiment 4: pretest `https://hdl.handle.net/11022/0000-0007-EB38-2` and eye-tracking `https://hdl.handle.net/11022/0000-0007-EB3A-0`; Experiment 5: `https://hdl.handle.net/11022/0000-0007-EB3D-D`).

7.1 Experiment 3: Conjunction Comparison

Experiment 3 aimed at affirming that the sentences with *sich verhalten* were similarly natural in both conditions. A secondary goal of this experiment was to investigate the result of the interpretation process of copular sentences with agentive and neutral conjunctions. It would be instructive to see whether the online processing difference observed in the eye-tracking study (Experiment 2 in the previous chapter) is mirrored by differences in acceptability of the resulting interpretations.

One important restriction on interpreting the results of this offline study is that by the nature of the acceptability rating paradigm, the participants evaluate the entire sentence at once. The crucial interest areas in Experiment 2 were before the end of the sentence (the preview, conjunction, and spillover; see Table 6.2). The target sentences were similar in all conditions, save for the experimental manipulation, until the spillover interest area. From then on, the sentences continued in different ways, because sentence-final interest areas had to adhere to constraints brought on by the syntax of the subordinate clauses headed by the two conjunctions.

Rating the entire sentence at once opens the door for the naturalness of the (up until now irrelevant) sentence endings to influence the outcome of the interpretation process. Some continuations might be less natural than others. The effects of the continuations' plausibility may influence the overall

Theory	Effect
Control conditions are adequate	*sich verhalten+weil* = *sich verhalten+um... zu*
Control conditions are biased	*sich verhalten+weil* < *sich verhalten+um... zu*
Underspecification Account	*war+weil* = *war+um... zu*
Coercion Account	*war+weil* > *war+um... zu*

Table 7.2: Predictions for acceptability ratings of control conditions and copular conditions in Experiment 3. >, <, = indicate differences in acceptability.

acceptability judgment. Thus, coercion effects and sentence end plausibility effects are intertwined in Experiment 3.

7.1.1 Predictions

The predictions for this experiment are summarized in Table 7.2. One set of predictions concerns the control conditions, whereas the other concerns the copular conditions.

The control conditions, i.e. sentences with the verb *sich verhalten*, were used as the base for calculating word length differences between the two conjunctions. If sentences with *sich verhalten* followed by the conjunction *um... zu* are more natural than sentences with *sich verhalten* followed by the conjunction *weil*, then this disparity will be visible in the difference in their acceptability ratings. If the control sentences vary in acceptability ratings, then the correction procedure is invalid and the effects found in Experiment 2 may be inaccurate.

If both conjunctions are equally natural together with *sich verhalten*, then they should have similar acceptability scores. Finding no differences between them would legitimize the word length correction performed in Experiment 2 and indirectly strengthen the claim that the difference observed therein was due to agentive coercion.

The second set of predictions is related to potential agentive reinterpretation in copular sentences. It is possible for the coercion effect observed in Experiment 2 to appear in acceptability ratings (Lukassek et al. 2017). The predictions for acceptability ratings in copular sentences with *um... zu* and *weil* are analogous to those for reading patterns in Experiment 2. The Coercion Account predicts lower acceptability in sentences where the stative main clause is combined with the agentive conjunction *um... zu* compared to combinations with the neutral conjunction *weil*. The Underspecification Account predicts no such differences, because the underspecified main clause can freely combine with both conjunctions.

7.1.2 Methods

Design

The experiment was an acceptability rating study with a 2×2 design. The within-subject and within-item factors were verb type (copula vs. *sich verhalten* 'to behave') and conjunction type (*um... zu* 'in order to' vs. *weil* 'because').

The random factors were item number and participant ID.

Materials

The materials consisted of the sentences used in Experiment 2, as in (130), repeated below. Some minor typos were corrected. All sentences used in the previous experiment were constructed to be as natural as possible. In order to diversify the acceptability of the sentence materials, five filler sentences were adjusted to lower their plausibility. Leaving the materials as they were might have caused the participants to focus on minor acceptability differences or be disturbed by the lack of low-acceptability sentences.

(130) a. Sophie war freundlich, und zwar um die Eltern stolz
Sophie was friendly and namely in.order the parents proud
auf sie zu machen.
of her to make
'Sophie was friendly, namely to make the parents proud of her.'

b. Sophie war freundlich, und zwar weil die Eltern sie
Sophie was friendly and namely because the parents her
gut erzogen haben.
good raised have
'Sophie was friendly, namely because the parents raised her well.'

c. Sophie verhielt sich freundlich, und zwar um die
Sophie behaved herself friendly and namely in.order the
Eltern stolz auf sie zu machen.
parents proud of her to make
'Sophie behaved friendly, namely to make the parents proud of her.'

d. Sophie verhielt sich freundlich, und zwar weil die
Sophie behaved herself friendly and namely because the
Eltern sie gut erzogen haben.
parents her good raised have
'Sophie behaved friendly, namely because the parents raised her well.'

Procedure

The experiment had the form of an online questionnaire and was programmed with OnExp ver. 1.2 (OnExp 2012). The participants were seated in front of a PC in a computer pool and were instructed to read the sentences. After reading a sentence, they were required to rate its naturalness. The stimulus presentation and rating scale was as in Experiment 1 (see Figure 6.1). Before the experiment, participants were asked to answer general questions concerning their native languages, age, gender, handedness, and federal state of origin. Next, they read instructions detailing the experimental task and providing examples of an experimental trial. At the start of the experiment, the participants trained on nine exercise sentences and at the end they read

Verb	Conjunction	Mean rating	SD	Min	Max
war	um… zu	3.73	2.08	1	7
war	weil	3.92	2.07	1	7
verhielt sich	um… zu	4.17	1.99	1	7
verhielt sich	weil	3.75	2.02	1	7
fillers	—	5.52	1.75	1	7

Table 7.3: Mean acceptability judgments for sentences in Experiment 3. Filler sentences lacked the conjunction manipulation.

a short explanation of the purpose of the study. The experimenter stayed in the back of the room and the participants were encouraged to ask them technical and task-related questions. The experiment took 29 minutes on average (between 17 and 41 minutes).

Participants

40 native speakers of German, aged 18 to 64 (mean age 26, SD=9) were recruited for the experiment. 31 were women, 38 were right-handed, and 31 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Brandenburg, Hesse, North Rhine-Westphalia, Rhineland-Palatinate, and Saarland. They were randomly assigned to lists (10 participants per list) and received 8 EUR or course credit as compensation.

7.1.3 Analysis and Results

The analysis was a linear mixed model calculated in R (R Core Team 2021). A summary of the data is presented in Table 7.3. The ratings were normalized via a z-transformation for each participant prior to the analysis.

There was a main effect of verb type (β=−0.10, SE=0.04, t[2297]=−2.58, p≤0.01, 95% CI: −0.17, −0.023), as well as a marginal effect of conjunction type (β=−0.07, SE=0.04, t[2297]=−1.79, p=0.07, 95% CI: −0.14, 0.01). Copular conditions were rated lower than the conditions with *sich verhalten*, and *weil* was rated slightly lower than *um… zu*.

The interaction between the factors was also significant (β=0.36, SE=0.07, t[2297]=4.87, p<0.01, 95% CI: 0.22, 0.50). A paired t-test found that the verb *sich verhalten* was rated higher when combined with the conjunction *um… zu* than with the conjunction *weil* (t_1[39]=4.75, p<0.01; t_2[59]=2.92, p<0.01). There was no difference between the copular conditions (ts<1.5).

7.1.4 Discussion

The difference in acceptability between the control sentences indicates that the sentences might have inconsistent naturalness. The verb *sich verhalten* was judged to be more natural with the shorter conjunction. If this preference translates to reading latencies, then the longer reading times on *weil* (compared to *um… zu*) were not due to word length differences, as previously assumed, but plausibility or expectation. Therefore, the word length correction in Experiment 2 may have been faulty and potentially introduced a confounding variable.

One caveat prevents the results of the acceptability judgment study from being straightforwardly related to the online one. The eye-tracking experiment targeted the sentence fragment containing only the conjunction and one interest area left and right of it. The naturalness ratings reflect the effects present after the entire sentence was read and the interpretation process finished. Due to syntactic constraints, the sentences differed between the conjunctions. Therefore, it is likely that the differences in how the sentences were continued played a major role in the final plausibility of the sentence. Furthermore, the effect interpreted in favor of the Coercion Account appeared on the preview interest area, which was unaffected by the correction procedure.

Nevertheless, one should not ignore the possibility that the results of Experiment 2 are inaccurate. In order to explore this possibility and separate interfering effects from genuine coercion effects, either the conjunctions need to be similar in length, or the control conditions need to be better suited to the task.

Lastly, there was no difference in ratings between copular sentences with the potentially coercing conjunction *um... zu* and the neutral *weil*. Finding lower acceptability for the former would have strengthened the claim of the Coercion Account. As it stands, the finding is somewhat in line with the Underspecification Account. However, the effect observed in Experiment 2 appeared in first pass regressions, a sensitive measure related to early processing that is incomparable to offline judgments. It is conceivable that the repair operation is relatively easy and the resulting interpretation is achieved without great difficulty. The subtle differences observable in fine-grained eye-tracking measures may be absent in offline acceptability judgments.

Both findings point to the need to replicate the results of Experiment 2. The following two experiments explore two different ways in which to remove the need for using *sich verhalten* as a control. Experiment 4 is a replication of Experiment 2 with improved control conditions, whereas Experiment 5 removed the need for such a correction altogether.

7.2 Experiment 4: Taking Control

Experiment 3 revealed that the control conditions used in the eye-tracking Experiment 2 have room for improvement. Replicating the effect in a new experiment would confirm that the effect found there was not spurious. This study is a replication of Experiment 2 with improved sentence material. If this experiment confirms the findings in Experiment 2, then such a result would support the Coercion Account and go against the Underspecification Account: the observed effect would be due to the agentive reinterpretation of the stative copular main clause.

Before conducting the study, it was crucial to create adequate control conditions. These new sentences were pre-tested for acceptability and later added to the original sentence materials from Experiment 2 in the new eye-tracking study.

7.2.1 Pretest

The pretest aimed at finding better sentences for correcting word length differences between the conjunctions *um... zu* and *weil*. The goal was to identify sentences where the main clause and the subsequent conjunction are highly compatible. Reading time and fixation differences between the two conjunctions in these sentences would, therefore, be purely a product of word length discrepancy.

Design and Materials

The acceptability judgment study had one within-subject and between-item factor conjunction type (*um... zu* 'in order to' vs. *weil* 'because'). 30 sentences with *um... zu* and 30 sentences with *weil* were constructed based on a random sample of 100 sentences with either conjunction extracted from the *Deutsches Referenzkorpus* TAGGED-T corpus via the COSMAS II interface (Kupietz, Lüngen, et al. 2018). An example item pair is presented in (140).

(140) a. Das Mädchen lernte jeden Tag, und zwar um die
The girl studied every day, and namely in.order the
Deutschprüfung zu bestehen.
German.exam to pass
'The girl studied every day, namely to pass the German exam.'

b. Der Ingenieur riet davon ab, und zwar weil das
The engineer advised from.it against, and namely because the
Risiko zu hoch war.
risk too high was
'The engineer advised against it, namely because the risk was too high.'

(141) subject+verb+main clause end+*und zwar*+conjunction+sentence end

The sentence structure followed the template in (141). The syntax resembled that of experimental items, but different subjects and verbs were used. The subjects in the control sentences were names (e.g. Liam), job descriptions (e.g. *Authorin* 'the author$_{fem}$'), or institutions (e.g. *Polizei* 'the police'). The sentences were in preterite tense, as were the items. The control sentences matched the original experimental items in overall length of each sentence segment. The control sentences were combined with 246 fillers from Experiment 3 and presented in a randomized order.

Procedure and Participants

The procedure, stimulus presentation, and rating scale were as in Experiments 1 and 3 (see Figure 6.1). The experiment took 31 minutes on average (between 20 and 76 minutes).

12 native speakers of German, aged 22 to 53 (mean age 28, SD=8), participated in the pretest and received 8 EUR or course credit as compensation. They had not taken part in any of the previous studies. 8 were women, all were right-handed, and 8 were monolingual German native speakers. Participants came from the federal states of Baden-Württemberg and Hesse. One participant did not answer this question, but later went on to write a PhD in German linguistics, so is a reliable source of judgment nonetheless.

Results and Discussion

The sentences with *um… zu* had a mean rating of 4.7 (SD=2.09) and the sentences with *weil* had a mean rating of 4.69 (SD=2.14). The difference was not significant ($t<0.5$). In comparison, the filler sentences had a mean rating of 6.0 (SD=1.48), which was significantly higher than the control sentences ($t[11]=4.91$, $p<0.01$, 95% CI: -1.23, -0.47). Control sentences rated lower than 4.5 were adjusted to better their naturalness. The resulting 60 sentences were deemed sufficiently plausible, especially considering that their ratings were numerically higher than those of the critical conditions in Experiment 2 (see Table 7.3).

7.2.2 Eye-Tracking Experiment: Replication of Experiment 2

Having created natural sounding control conditions, we can distinguish between agentive coercion and the effects of word length. This eye-tracking experiment was a replication of Experiment 2; therefore, much of the following sections is identical to the previous study.

Predictions

The predictions for both the Underspecification and the Coercion Accounts are unchanged from the previous experiment. The Underspecification Account argues that the copula's situational argument is underspecified. Specification takes place when the predicate construction is combined with pertinent sentence material. Thus, the combination of an underspecified copula construction with an agentive clause should be processed equally easily as with a stative clause. Specifically, the combination of an underspecified main clause containing the copula should proceed the same way with the neutral *weil* as with the agentive conjunction *um… zu* (conditions (130a) and (130b), respectively).

In contrast, the Coercion Account posits that the copula's situational argument is stative. The combination of a copula predicate construction with a matching stative continuation should be straightforward. The addition of an incompatible eventive continuation will cause a clash, which will necessitate a cognitively costly reinterpretation of the copula predicate construction. The increase in cognitive effort due to coercion should be visible in conditions with the agentive conjunction *um… zu* compared to the state-compatible conjunction *weil* (conditions (130a) and (130b), respectively). Table 6.3 on page 117 provides an overview of the expected effects.

IA 1	IA 2	IA 3	*IA 4*	*IA 5*	*IA 6*	IA 7
Name	verb	adjective	*preview*	*conjunction*	*spillover*	sentence end.

Table 7.4: Item segmentation into invisible interest areas (IAs) in Experiments 4 and 5. Critical IAs are marked in cursive.

Design

This eye-tracking during reading study had a 2×2 design (counterbalanced within-item and within-subject) with factors conjunction type (*um… zu* 'in order to' vs. *weil* 'because') and verb type (copula vs. *sich verhalten* 'to behave'). The random factors were item number and participant ID.

Materials

Materials consisted of the same sentences as in Experiment 2 with the addition of 60 new control sentences. Examples of item and control sentences are provided in (130) and (140); see also Appendices C and D. Half of the control sentences contained the conjunction *um… zu* and the other half contained the conjunction *weil*. Minor typos in the original sentences from Experiment 2 were corrected. The segmentation into interest areas remained unchanged from Experiment 2 (see Table 7.4). The control sentences were divided in the same manner, with interest areas 6–7 being split into approximately the same length as corresponding interest areas in the items.

As before, 60 items in four conditions were distributed over four lists in a Latin square design. Each participant saw the items only once with alternating conditions. The items were combined with control conditions and 246 fillers. In total, 366 sentences were presented in one of four pseudorandomized orders, so that the items were separated by at least two filler sentences. The control conditions did not immediately follow any of the items and no items in the same condition immediately followed one another. The presentation order was counterbalanced across the lists.

A third of the sentences was followed by a simple comprehension question, which targeted the main clause and the subordinate clause equally frequently. This ensured that the participants read the entire sentence carefully. In half of the questions, the correct answer was presented on the right; see also example (138) in Chapter 6.

Participants

40 native speakers of German, aged 18 to 32 (mean age 23, SD=4), were recruited for the experiment. 28 were women, 37 were right-handed, and 39 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Hamburg, Hesse, Lower Saxony, North Rhine-Westphalia, and Rhineland-Palatinate. One participant did not specify the federal state and one was originally from Russia, but their performance did not differ from other participants and their exclusion from the analyses did not affect the results. The right eye was tracked for 20 par-

ticipants. The participants were randomly assigned to lists (10 subjects per list). The participants had normal or corrected to normal vision. They were naïve to the purpose of the study and had not participated in the previous experiments. The participants received 15 EUR or course credit as compensation. The mean correct answer rate to comprehension questions was 98% (between 93% and 99%, SD=2%).

Procedure and Analysis

The procedure, data preparation, and analysis were the same as in Experiment 2 in Chapter 6; see Figure 6.2. The entire experiment took about 70 minutes on average (between 60 and 90 minutes). Overall, 4% of fixations were removed from the analysis and 2% were merged during preprocessing with SR Research EyeLink Data Viewer. Another 0.05% of outlier fixations were removed from the analysis. Reading and fixation times were log-transformed and analyzed in logit mixed effect model analyses. Regression proportions were analyzed in generalized linear mixed models.

As before, first pass reading times and first fixation durations on the conjunction interest area were adjusted per participant. Unlike in the original experiment, the new control conditions were used for calculating the duration difference. The average delay was 15.0 ms for first pass duration and 10.9 ms for first fixation duration, compared to 17.6 ms and 7.5 ms in Experiment 2.

Results

All significant effects within the target interest areas are reported. Descriptive statistics are summarized in Table 7.5 and inferential statistics in Table 7.6. Reading times and regressions are illustrated in Figure 7.1.

First pass duration: There was a main effect of conjunction type on the spillover interest area. Sentences with *um... zu* were read faster than those with *weil*.

First fixation duration: In parallel to the first pass duration, sentences with *weil* were fixated on for longer that those with *um... zu* on the spillover interest area (main effect of conjunction type).

Regression path duration: The analysis revealed the same main effect of conjunction type as in the first pass and first fixation durations. Sentences with *um... zu* were re-read faster than those with *weil* on the conjunction and the spillover interest areas.

Second pass duration: A marginal main effect of verb type appeared on the conjunction interest area. Copular sentences triggered longer reading times than sentences with *sich verhalten*.

First pass regression ratios: There was a marginal interaction between verb and conjunction type on the preview interest area. Planned comparisons revealed that the copula in combination with *um... zu* caused marginally more frequent regressions than when combined with *weil* ($t_1[39]=1.45$, $p=0.15$, 95% CI: -0.01, 0.05; $t_2[59]=2.31$, $p<0.05$, 95% CI: 0.00, 0.06). Copular sentences were also re-read slightly longer than ones with *sich verhalten* (marginal main effect of verb type on the spillover interest area).

IA	Verb	Conjunction	Mean (SD)	Min	Max
First pass duration					
6	war	um... zu	320.11 (154.71)	81	1047
6	war	weil	336.63 (174.07)	94	1358
6	verhielt sich	um... zu	308.62 (152.38)	86	1191
6	verhielt sich	weil	323.52 (140.85)	82	782
First fixation duration					
6	war	um... zu	217.86 (59.14)	81	516
6	war	weil	223.77 (67.15)	94	670
6	verhielt sich	um... zu	215.14 (57.27)	86	544
6	verhielt sich	weil	218.98 (61.61)	82	696
Regression path duration					
5	war	um... zu	234.00 (101.56)	108	935
5	war	weil	255.27 (127.33)	103	885
5	verhielt sich	um... zu	228.34 (87.34)	100	828
5	verhielt sich	weil	244.42 (96.96)	107	713
6	war	um... zu	350.45 (202.65)	81	2151
6	war	weil	382.84 (226.00)	94	1822
6	verhielt sich	um... zu	339.63 (198.21)	86	1530
6	verhielt sich	weil	355.49 (180.89)	90	1679
Second pass duration					
5	war	um... zu	230.88 (75.22)	155	433
5	war	weil	233.58 (83.25)	88	460
5	verhielt sich	um... zu	207.92 (134.86)	108	638
5	verhielt sich	weil	217.42 (68.11)	82	346
First pass regression ratios					
4	war	um... zu	0.06 (0.23)	0	1
4	war	weil	0.03 (0.17)	0	1
4	verhielt sich	um... zu	0.04 (0.19)	0	1
4	verhielt sich	weil	0.04 (0.20)	0	1
6	war	um... zu	0.07 (0.26)	0	1
6	war	weil	0.10 (0.30)	0	1
6	verhielt sich	um... zu	0.07 (0.25)	0	1
6	verhielt sich	weil	0.08 (0.27)	0	1

Table 7.5: Mean differences between target conditions in Experiment 4. Durations are in ms, first fixation durations and first pass reading times are adjusted for conjunction length. SD = standard deviation.

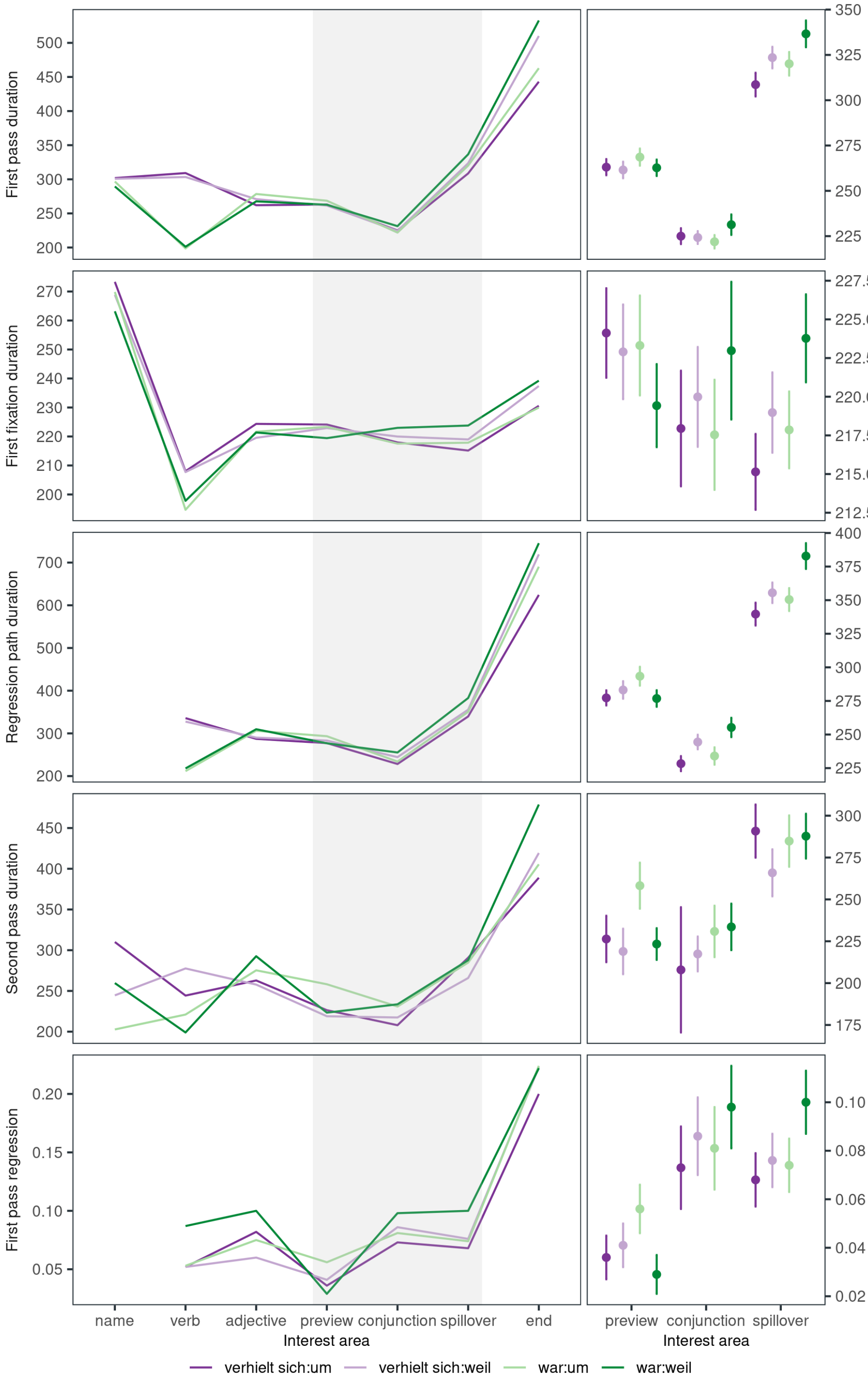


Figure 7.1: Results of Experiment 4. Durations were adjusted for word length, but regression proportions were not. Error bars are standard errors of the mean and target interest areas are marked in gray.

IA	Variable	Est.	SE	df	t/z	p≤	95% CI
First pass duration							
6	(intercept)	5.66	0.04	65	158.76	0.00	5.59, 5.74
6	conjunction	0.05	0.02	2134	3.17	0.01	0.02, 0.08
First fixation duration							
6	(intercept)	5.35	0.02	41	270.11	0.00	5.31, 5.39
6	conjunction	0.02	0.0	2136	2.19	0.03	0.00, 0.04
Regression path duration							
5	(intercept)	5.43	0.02	39	220.70	0.00	5.38, 5.48
5	conjunction	0.07	0.02	1084	3.91	0.00	0.04, 0.11
6	(intercept)	5.70	0.04	103	149.39	0.00	5.62, 5.77
6	conjunction	0.07	0.03	2135	2.56	0.01	0.02, 0.12
Second pass duration							
5	(intercept)	5.34	0.05	24	114.17	0.00	5.25, 5.43
5	verb	0.13	0.07	97	1.91	0.06	−0.01, 0.27
First pass regression ratios							
4	(intercept)	−3.48	0.21		−16.34	0.00	−3.89, −3.06
4	verb×conjunction	−0.85	0.49		−1.76	0.08	−1.81, 0.10
6	(intercept)	−3.00	0.22		−13.42	0.00	−3.48, −2.57
6	verb	0.28	0.17		1.65	0.10	−0.07, 0.63

Table 7.6: Significant effects found in Experiment 4. Logit mixed-effect model for regression ratios, linear mixed-effect models for regressions. CI = confidence interval; df = degrees of freedom; Est. = estimate; IA = interest area; SE = standard error.

Reading span task: The mean accuracy on the reading span task was 97.3% (min=89%, max=100%). The mean partial reading span score was 58.4 (SD=12.89, min=11, max=75). The participants were divided into two groups based on their reading span score: a lower reading span group ≤ 60 and a high reading span group > 60 (20 and 20 participants, respectively). The reading span group interacted with the conjunction type on the spillover interest area in the first pass regressions (β=−0.86, SE=0.52, z=−1.66, p<0.1, 95% CI: −1.87, 0.16). Participants in the higher reading span group launched more regressions while reading *weil* than those in the lower reading span group (0.12 vs. 0.06), but the difference was not significant.

Discussion

Experiment 4 attempted to replicate the findings of Experiment 2 with improved control sentences. The results, summarized in Table 7.7, are mixed. Overall, there were fewer effects in this experiment compared to the previous one and three new or divergent ones. Importantly, the predicted interaction between the factors that was visible on the preview interest area in first pass regressions was visible here as well. This finding is advantageous in that it does not rely on a length correction.[1]

This experiment offers some support to the Coercion Account, which posits that the copula is stative and the agentive interpretation of *being*

[1]See Chapter 10 for a discussion on the strength and reliability of the effects.

IA	Experiment 2	Experiment 4	Results
First pass duration			
5	be > act	—	✗
5	act+*weil* > act+*um... zu*	—	✗
6	*weil* > *um... zu*	*weil* > *um... zu*	✓
First fixation duration			
5	be > act	—	✗
5	act+*weil* > act+*um... zu*	—	✗
6	—	*weil* > *um... zu*	✗
Regression path duration			
5	be > act	—	✗
5	*weil* > *um... zu*	*weil* > *um... zu*	✓
6	be > act	—	✗
6	*weil* > *um... zu*	weil > *um... zu*	✓
Second pass duration			
5	—	be > act	✗
First pass regression ratios			
4	be+*um... zu* > be+*weil*	be+*um... zu* > be+*weil*	✓
5	be+*um... zu* < be+*weil*	—	✗
6	be+*um... zu* < be+*weil*	be > act	✗

Table 7.7: Comparison of effects between Experiment 2 and its replication, Experiment 4. The copula *sein* is translated as 'be' and *sich verhalten* as 'act'. — = no effect; ✓= same result; ✗= different result.

friendly is due to the reinterpretation of a defective representation. If Sophia is acting friendly, then she must exert some effort. If she is friendly by nature, then friendliness comes at no cost.

In sum, the present experiment succeeded in replicating the critical coercion effect found in Experiment 2. Finding the same effect in both studies is reassuring for the methodology and the initial conclusion that the copula is stative, as argued by the Coercion Account.

Both eye-tracking studies relied on a correction to account for the differences in the length of the conjunctions. This was important as the conjunctions were the trigger for probing the state and event interpretations of the copular clause. However, is it possible to sidestep the conjunction length issue altogether? The next experiment attempts to do just that.

7.3 Experiment 5: Changing Because

Experiments 2 and 4 investigated the computation of the copula in combination with two conjunctions: the agentive conjunction *um... zu* 'in order to' and the ambiguous causal conjunction *weil* 'because'. The results pointed to the stative nature of the copula. One issue with the previous studies is that the word length differences between the conjunctions led to the need to distinguish between the effects of word length and interpretation. In order to avoid the need to control for this issue, the present experiment used *da* 'because, since' as the neutral counterpart to *um... zu*.

Weil and *da* are semantically and syntactically very similar; therefore, the differences between them are subtle (Breindl, Volodina, et al. 2014; Buscha 1989). Both causal conjunctions can be used virtually interchangeably, as in (142), adapted from Breindl, Volodina, et al. (2014). *Weil* is the most commonly used causal conjunction (in corpora, 56940 hits per 10000 words), compared to its two closest contestants *denn* 'because' and *da* (in corpora, 52348 and 28537 hits, respectively); data from Breindl, Volodina, et al. (2014, p. 818), see also Breindl and Walter (2009, p. 41). *Da* is more likely to be used in ante-position than *weil* is. Unlike the latter, *da* is less likely to be used as an interjection in a sentence; see (143), from Breindl, Volodina, et al. (2014, p. 863). Answers to questions about the reason for something can be answered by using *weil*, but not *da*, as in (144), adapted from Buscha (1989). *Da*, but not *weil*, can be used for a temporal meaning (145) and in a deictic fashion (146); both examples retrieved from PONS (2018).

Despite these differences, *da* and *weil* remain overwhelmingly interchangeable as conjunctions. In sentences such as (147), *da* and *weil* are in a subordinate clause, where they function unambiguously as conjunctions.

(142) Weil/Da Peter krank ist, geht er zum Arzt.
because Peter ill is goes he to.the doctor
'Since Peter is ill, he goes to the doctor.'

(143) Wahrscheinlich, weil/*da Peter am Fenster stand, konnte er das
probably because Peter by.the window stand could he the
Geschehen vor dem Haus genau beobachten.
events in.front of.the house closely observe
'Probably, because Peter was standing by the window, he could closely observe the events in front of the house.'

(144) a. Warum kommt er nicht?
why come he not
'Why isn't he coming?'

b. Weil/*Da er krank ist.
because he sick is
'Because he is sick.'

(145) Von da an herrschte endlich Ruhe.
From then on prevailed finally peace
'From then on, peace finally prevailed.'

(146) Athen? da möchte ich auch einmal hin!
Athens? there want I also someday to.there
'Athens? I want to go there someday, too!'

(147) Sophie war freundlich, und zwar weil/da die Eltern sie gut
Sophie was friendly and namely because the parents her good
erzogen haben.
raised have
'Sophie was so friendly, namely because the parents raised her well.'

Substituting *da* for *weil* has two distinct advantages. It removes the need to control for word length, because the conjunctions are the same length in the critical interest area. Furthermore, it tests the coercion effects found in Experiment 2, as *weil* is replaced by an equivalent conjunction. Replicating the findings of Experiment 2 would strengthen the claim of the Coercion Account that the copula is semantically stative. It would also reinforce the conclusion that the increased regressions found in the previous study were due to reinterpretation. Failing to replicate these results would put into question whether the findings were legitimate, the comparison between the conjunctions was appropriate, and the correction for word length was sensible.

7.3.1 Methods

Design and Materials

The study had a 2×2 design with within-factors verb type (copula *sein* vs. *sich verhalten* ‘to behave’) and conjunction (*um… zu* ‘in order to’ vs. *da* ‘because’). The random factors were item number and participant ID.

The experimental items differed from those in Experiment 2 only in the choice of conjunction. An example item is presented in (148). The sentence segmentation was as in Experiments 2 and 4 (see Table 7.4). As before, the analysis was restricted to the conjunction and the surrounding interest areas (IAs 4–6).

(148) a. Sophie war freundlich, und zwar um die Eltern stolz
Sophie was friendly and namely in.order the parents proud
auf sie zu machen.
of her to make
‘Sophie was friendly, namely to make the parents proud of her.’

b. Sophie war freundlich, und zwar da die Eltern sie
Sophie was friendly and namely because the parents her
gut erzogen haben.
good raised have
‘Sophie was friendly, namely because the parents raised her well.’

c. Sophie verhielt sich freundlich, und zwar um die
Sophie behaved herself friendly and namely in.order the
Eltern stolz auf sie zu machen.
parents proud of her to make
‘Sophie behaved friendly, namely to make the parents proud of her.’

d. Sophie verhielt sich freundlich, und zwar da die
Sophie behaved herself friendly and namely because the
Eltern sie gut erzogen haben.
parents her good raised have
‘Sophie behaved friendly, namely because the parents raised her well.’

Predictions

As before, the Underspecification Account argues that the copula remains underspecified in (148a), at least up to the end of the main clause. The flexibility of the conjunction *da* in (148d) allows it to be effortlessly integrated without the need of reinterpretation. The same is true of the agentive conjunction *um... zu*.

The predictions of the Coercion Account also remain unchanged: the copula is specified as stative up until the conjunction interest area. The combination with the agentive conjunction *um... zu* in (148a) enforces an agentive reinterpretation, which leads to increased processing effort. No reinterpretation is needed in (148b), where the main clause composes with a state-compatible conjunction. Therefore, the Coercion Account predicts an interaction between the factors verb type and conjunction type.

In sum: the Underspecification Account predicts that there should be no processing differences between (148a) and (148b).

Participants

40 native speakers of German, aged 18 to 53 (mean age 24, SD=6), were recruited for the experiment. 30 were women, 35 were right-handed, and 37 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Bremen, Hamburg, Hesse, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Schleswig-Holstein, and Saxony. The right eye was tracked for 27 participants. The participants were randomly assigned to lists (10 subjects per list). The experiment took around 70 minutes on average (between 60 and 90 minutes).

The participants had normal or corrected to normal vision. They were naïve to the purpose of the study and had not participated in the previous experiments. They received 15 EUR as compensation. The mean correct answer rate to comprehension questions was 98% (range 94.4% to 99.1%, SD=1.3%). Only the participants who successfully completed the reading span task and were native speakers of German were included in the analysis. This resulted in the exclusion of two participants, who were subsequently replaced.

Procedure and Analysis

The procedure, data preparation, and analysis were the same as in Experiments 2 and 4, see Figure 6.2 and the description in Chapter 6. Overall, 3% of fixations were removed from the analysis and 1% were merged. After preprocessing, a few extreme outliers were removed (0.04% fixations). The statistical analysis, calculated in R (R Core Team 2021), included linear mixed models and generalized linear mixed models.

7.3.2 Results

All significant effects within the target interest areas are reported. Descriptive statistics are summarized in Table 7.8 and inferential statistics in Table 7.9.

IA	Verb	Conjunction	Mean (SD)	Min	Max
First pass duration					
5	war	um... zu	222.88 (62.89)	97	572
5	war	da	236.34 (89.87)	82	616
5	verhielt sich	um... zu	212.51 (61.29)	92	480
5	verhielt sich	da	238.81 (90.18)	85	672
6	war	um... zu	327.64 (153.92)	117	1102
6	war	da	368.80 (184.00)	89	1358
6	verhielt sich	um... zu	325.85 (154.56)	94	1287
6	verhielt sich	da	358.77 (180.48)	93	1252
First fixation duration					
4	war	um... zu	224.01 (61.10)	93	599
4	war	da	225.38 (57.52)	90	494
4	verhielt sich	um... zu	226.14 (57.09)	85	543
4	verhielt sich	da	233.65 (63.91)	86	551
5	war	um... zu	221.10 (60.50)	97	572
5	war	da	232.61 (86.05)	82	616
5	verhielt sich	um... zu	211.41 (60.06)	92	480
5	verhielt sich	da	231.95 (77.98)	85	598
6	war	um... zu	223.86 (58.95)	117	466
6	war	da	238.41 (74.83)	89	610
6	verhielt sich	um... zu	220.91 (56.08)	94	486
6	verhielt sich	da	239.90 (79.99)	93	628
Regression path duration					
5	war	um... zu	254.37 (117.64)	97	836
5	war	da	296.47 (189.35)	82	1319
5	verhielt sich	um... zu	242.97 (120.74)	92	1105
5	verhielt sich	da	266.24 (130.60)	114	935
6	war	um... zu	375.93 (227.45)	121	2245
6	war	da	456.95 (277.48)	89	1776
6	verhielt sich	um... zu	364.46 (203.38)	94	1934
6	verhielt sich	da	442.87 (281.31)	93	2261
Second pass duration					
6	war	um... zu	277.37 (151.10)	109	962
6	war	da	294.95 (182.65)	84	1168
6	verhielt sich	um... zu	261.81 (149.07)	81	712
6	verhielt sich	da	326.61 (204.74)	96	1078
First pass regression ratios					
6	war	um... zu	0.09 (0.29)	0	1
6	war	da	0.16 (0.37)	0	1
6	verhielt sich	um... zu	0.08 (0.27)	0	1
6	verhielt sich	da	0.16 (0.37)	0	1

Table 7.8: Mean differences between target conditions in Experiment 5. Durations are in ms. SD = standard deviation.

IA	Variable	Est.	SE	df	t/z	p≤	95% CI
First pass duration							
5	(intercept)	5.38	0.02	39	218.36	0.00	5.33, 5.43
5	conjunction	−0.07	0.02	892	−3.69	0.00	−0.10, −0.03
5	verb×conjunction	0.07	0.04	896	1.93	0.05	−0.00, 0.14
6	(intercept)	5.73	0.03	67	171.02	0.00	5.66, 5.79
6	conjunction	−0.10	0.02	2154	−5.91	0.00	−0.13, −0.07
First fixation duration							
4	(intercept)	5.39	0.02	38	266.35	0.00	5.36, 5.43
4	verb	−0.02	0.01	1874	−2.15	0.03	−0.04, −0.00
4	conjunction	−0.02	0.01	1864	−2.00	0.05	−0.04, −0.00
5	(intercept)	2.31	0.01	66	191.76	0.00	2.29, 2.33
5	verb	0.02	0.01	904	2.07	0.04	0.00, 0.04
5	conjunction	−0.04	0.01	903	−3.54	0.00	−0.06, −0.02
5	verb×conjunction	−0.03	0.01	905	−1.80	0.07	−0.06, 0.00
6	(intercept)	5.40	0.02	43	339.95	0.00	5.37, 5.43
6	conjunction	−0.06	0.01	2161	−5.50	0.00	−0.08, −0.04
Regression path duration							
5	(intercept)	5.48	0.03	41	162.29	0.00	5.41, 5.55
5	verb	0.04	0.02	873	1.88	0.06	−0.00, 0.09
5	conjunction	−0.08	0.02	888	−3.58	0.00	−0.13, −0.04
6	(intercept)	5.86	0.04	63	138.59	0.00	5.77, 5.94
6	conjunction	−0.17	0.02	2155	−9.31	0.00	−0.21, −0.14
Second pass duration							
6	(intercept)	5.52	0.04	36	150.99	0.00	5.45, 5.59
6	conjunction	−0.12	0.05	469	−2.57	0.01	−0.21, −0.05
6	verb×conjunction	0.20	0.09	454	2.17	0.03	0.02, 0.39
First pass regression ratios							
6	intercept	−2.91	0.25		−11.83	0.00	−3.43, −2.44
6	conjunction	0.91	0.20		4.53	0.00	0.52, 1.33

Table 7.9: Significant effects found in Experiment 5. Logit mixed-effect model for regression ratios, linear mixed-effect models for regressions. CI = confidence interval; df = degrees of freedom; Est. = estimate; IA = interest area; SE = standard error.

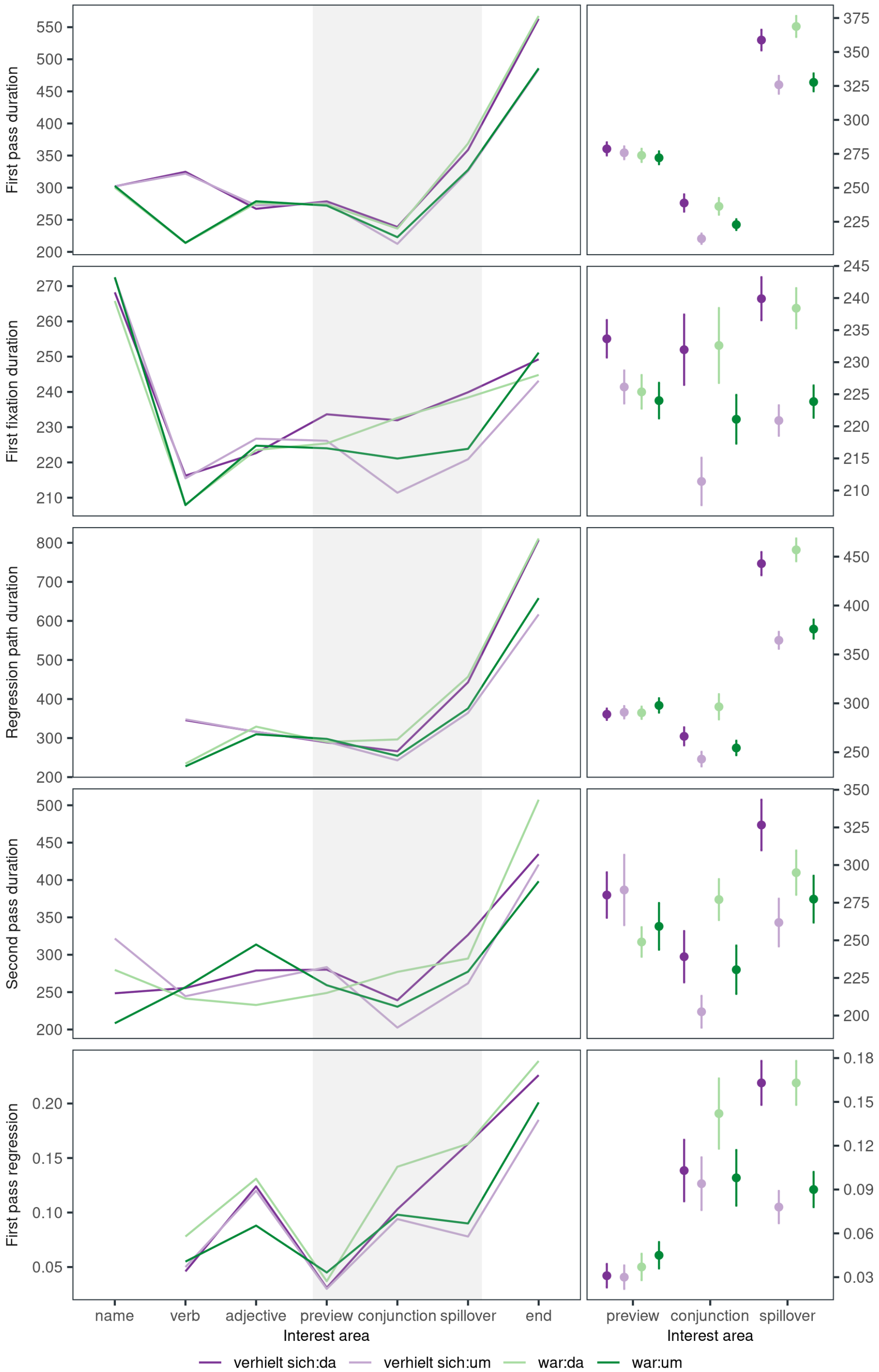


Figure 7.2: Results of Experiment 5. Error bars are standard errors of the mean and target interest areas are marked in gray.

Reading times and regressions are illustrated in Figure 7.2.

First pass duration: There was a main effect of conjunction type on the conjunction and spillover interest areas. Sentences with *da* elicited longer reading times than sentences with *um… zu*. The conjunction interest area also housed a marginal interaction between the factors. *Sich verhalten* combined with *um… zu* led to shorter reading times than when combined with *da* ($t_1[38]=2.40$, $p<0.05$, 95% CI: 4.00, 47.46; $t_2[59]=3.54$, $p<0.01$, 95% CI: 11.31, 40.76).

First fixation duration: Da triggered longer fixations than *um… zu* in all interest areas (main effect of conjunction type). Initially, copular sentences were fixated shorter than sentences with *sich verhalten* (preview interest area), but this pattern was reversed on the conjunction and spillover interest areas (main effect of verb type). In parallel to the first pass reading time, there was a marginal interaction between the factors on the conjunction interest area. *Um… zu* caused shorter fixation than *da* when combined with *sich verhalten* ($t_1[38]=2.16$, $p<0.05$, 95% CI: 1.34, 41.01; $t_2[59]=3.21$, $p<0.01$, 95% CI: 8.02, 34.56).

Regression path duration: Here as well, *da* lead to longer re-reading times than *um… zu* on the conjunction and spillover interest areas (main effect of conjunction type).

Second pass duration: In line with other measures, the participants spent more time in conditions with *da* than with *um… zu* on the spillover interest area. Furthermore, there was an interaction between the factors. The combination of *sich verhalten* with *da* caused longer reading times than *sich verhalten* together with *um… zu* ($t_1[32]=2.17$, $p<0.05$, 95% CI: 4.70, 146.53; $t_2[47]=2.37$, $p<0.05$, 95% CI: 9.18, 112.62).

First pass regression ratios: As before, the analysis of the spillover interest area revealed a main effect of conjunction type. *Da* caused more frequent regressions than *um… zu*.

Reading span task: The mean accuracy on the reading span task was 96.6% (SD=2.6%, min=88%, max=100%). The mean partial reading span score was 58.8 (SD=11.7, min=30, max=73). As in Experiments 2 and 4, the participants were divided into two groups based on their reading span score: a lower reading span group ≤ 60 and a high reading span group > 60 (21 and 19 participants, respectively).

The reading span task group interacted with the conjunction and verb types on the conjunction interest area in first pass regression ratios ($\beta=-3.05$, SE=1.17, $z=-2.62$, $p<0.01$, 95% CI: -5.34, -0.77). However, these differences were caused by the reading behavior in the control conditions. The analysis of the second pass reading times on the conjunction interest area revealed an interaction between the conjunction type and reading span group ($\beta=0.19$, SE=0.09, $t[237]=2.05$, $p<0.05$, 95% CI: 0.01, 0.37). Lower reading spans were associated with longer reading times on *da* than *um… zu* ($t_1[32]=-2.17$, $p<0.04$, 95% CI: -146.53, -4.70; $t_2[47]=-2.37$, $p<0.02$, 95% CI: -112.62, -9.18).

7.3.3 Discussion

The results of Experiment 5 were surprising, because the only reliable effect was that of the causal conjunction *da* 'because' being more difficult to process than *um… zu* 'in order to'. It appears that, despite their similarities, *da* and *weil* are quite different in their syntactic preferences. Going against these preferences has a profound effect on reading behavior. This unexpected finding underlines the importance of empirically validating theories and intuitions about syntax and semantics. Unfortunately, in this case, *da* proved to be an inadequate measure for comparing stative and agentive friendliness.

Unlike in Experiments 2 and 4, there were no effects which could be interpreted as coercion in the present experiment. This could mean that the coercion effect observed in the previous studies was a by-product of the conjunction correction method. However, it is more likely that a coercion effect was overshadowed by the unexpectedness and massive dispreference of *da*'s syntactic position.

7.4 General Discussion

The experiments presented in this chapter focused on distinguishing between true coercion effects and interference from conjunction differences. Experiment 3 showed that there was a systematic problem with the control conditions in the previous study. The control sentences used therein were dissimilar in acceptability, a result that jeopardizes the overarching goal of this thesis, i.e. determining the copula's underlying eventuality properties.

Experiment 4 was a replication of Experiment 2 with improved control sentences. The study succeeded in replicating the results of Experiment 2, yet some discrepancies remained (see Table 7.7). Notably, the coercion effect found in the previous experiment was present in the Experiment 4.

The final study, Experiment 5, avoided the need for control conditions whatsoever by using the conjunction *da* 'because' instead of the synonymous *weil* as a comparison to *um… zu* 'in order to'. The findings showed that readers had a strong preference as to the syntactic position of *da* compared to *weil*. The former is expected to be in ante-position at the beginning of the sentence. By appearing in the middle of the sentence, it subverted the readers' expectations in an unfavorable way. Thus, the results were uninterpretable for the distinction between Sophia's stative and active friendliness.

In sum, the results of the studies conducted so far point to the stative nature of the copula and Sophia's friendliness. The findings are in line with the predictions of the Coercion Account. Nevertheless, some issues remain and the effects themselves could stand to be stronger. The next chapter addresses another structurally weak point of Experiments 2 and 4, before returning to the adjective predicates themselves.

8

Between Syntax and Control: Experiments 6, 7, and 8

The previous experiments indicated that the copula is stative. The aspectual reinterpretation of the state to an activity is associated with increased cognitive effort, as evidenced by more frequent regressions for coercion compared to composition. This effect appeared reliably (if weakly) in Experiment 2 and Experiment 4. Experiments 3–5 also addressed valid critiques pertaining to the control conditions used in the original study, specifically the naturalness of the conjunction types. In practical terms, these results attest to the fact that Sophia is truly friendly by nature. Implications of active and possibly deceitful friendliness on Sophia's side are the product of reinterpretation.

However, the previous studies did not take into consideration one other difference between the conjunctions: their syntax, an oversight rectified in this chapter. Experiment 6 investigated whether the syntactic differences between the conjunctions play a role in the processing of copular sentences. This self-paced reading experiment aimed to confirm the results found in the last eye-tracking study, as well as control for the different syntax underlying the conjunctions *weil* 'because' and *um… zu* 'in order to' (see Figure 8.1).

Since the factor conjunction type is proving to be quite cumbersome, the subsequent two studies do away with it altogether in favor of turning the focus back to the adjective. Experiment 7 revisited the adjectival predicates and probed their controllability in an acceptability rating study. This experiment used a different manipulation from the one in Experiment 1, which tested adjectives' compatibility with two German verbs 'to act' (*sich verhalten* and *sich benehmen*). Instead, the present study employed the adverbs *absichtlich* 'intentionally', *bewusst* 'deliberately', and *freiwillig* 'voluntarily' to manipulate each adjective's agentive interpretation (Brennenstuhl 1976; Buscher 2018; Scheifele and Bücking 2021).

Lastly, Experiment 8 focused on the interpretation of the copula paired with stage-level and individual-level predicates in purely agentive sentences. Thus far the adjectives used in Experiments 2–6 were at least reconcilable with an event interpretation, but Experiment 8 explored what happens when they are not. Exclusively stative copular main clauses and potentially activity-compatible ones were combined with an agentive conjunction in a self-paced reading study with a sensicality judgment task.

Unlike the previous reading time studies, Experiments 6 and 8 used the self-paced reading paradigm. This paradigm has proved reliable in finding coercion effects, if somewhat less sensitive than eye-tracking (see Chapter 5 for an overview of coercion effects in reading time studies). This method forces participants to read the stimuli incrementally, while focusing on the presented sentence fragment. Finding reading differences corresponding to the results of the eye-tracking studies 2 and 4 would be instructive to understanding the underlying cognitive processes guiding Sophia's behavior and the sentences in (1)–(2). Furthermore, Experiments 7 and 8 were conducted remotely. Admittedly, the primary reason for switching to online and out-of-lab data collection is the raging and grossly mismanaged pandemic, coupled with vaccination resistance. It did not feel safe to invite participants into the lab while a highly infectious disease is killing hundreds each day.

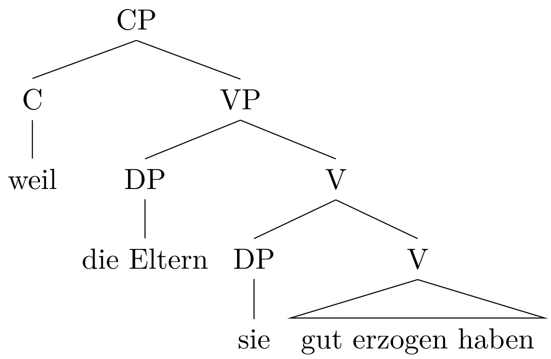
All sentence materials, results, and analysis files are available upon request from the Tübingen Archive of Language Resources (Experiment 6: `https://hdl.handle.net/11022/0000-0007-EB3E-C`; Experiment 7: `https://hdl.handle.net/11022/0000-0007-F04F-2`; Experiment 8: `https://hdl.handle.net/11022/0000-0007-F050-F`).

8.1 Experiment 6: Watching Syntactic Trees Grow

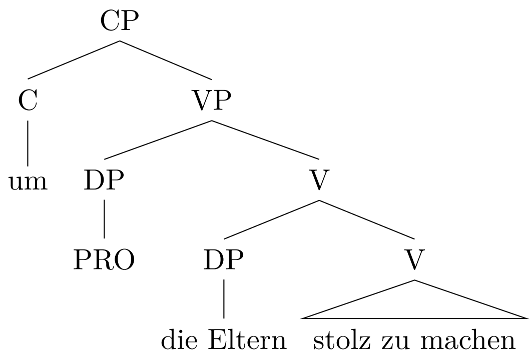
Experiments 2 to 4 relied on the semantic differences between two conjunctions *weil* 'because' and *um... zu* 'in order to' to probe the state and activity interpretations of the copular clauses. The former is a neutral conjunction and the latter is an agentive one. However, the syntactic differences between these conjunctions have hitherto been largely ignored.

Weil and *um... zu* differ in their syntax, as depicted in Figure 8.1. The former has an overt subject and object, whereas the latter has an overt object but a silent PRO subject (Sternefeld 2006). Interpreting the silent PRO might require more effort than interpreting an overt subject, leading to processing delays for *um... zu* compared to *weil*. Therefore, the effects observed in previous experiments could be a by-product of syntactic variation rather than semantic or pragmatic factors. Could the syntactic difference between *weil* and *um... zu* explain the effects?

This self-paced reading experiment aimed at differentiating between effects stemming from structural differences and ones interpreted as caused by reinterpretation. The study exploited the fact that shifting the conjunctions to the front of the sentence forces the reader to interpret the conjunction, as well as its subject and object, without the interference of other semantic factors. Thus, if the conjunctions in the inverse word order sentences differ, then this is due to their syntax rather than coercion. A second goal of this



(a) *Weil* ‘because’



(b) *Um... zu* ‘in order to’

Figure 8.1: Syntactic representation of subordinate clauses headed by the conjunctions *weil* and *um... zu*, adapted from Sternefeld (2006).

experiment was to attempt to find a coercion effect analogous to the one in the eye-tracking studies 2 and 4.

8.1.1 Methods

Design

The study had a 2×2 design with the within-subject and within-item factors conjunction (*um… zu* 'in order to' vs. *weil* 'because') and word order (normal vs. inverted). The random factors were item number and participant ID.

Materials

The experimental sentences were adapted from Experiment 4. Two conditions were retained and two additional conditions were included to test the syntactic differences. A sample item is presented in (149) and the full list of items is provided in Appendix E.

60 items were combined with 60 control sentences, 200 fillers with a standard syntax, and 46 fillers with a conjunction in anteposition. In total, the participants saw 290 sentences in the canonical word order and 76 in inverse word order. Although certainly there was a valid reason for this proportion of inverse to canonical word order sentences, at the time of writing I have forgotten what it was. It likely had something to do with the large number of sentences in the experiment. In hindsight, this appears to be a design flaw, the rectification of which I must leave for future research.

The sentences were distributed over four counterbalanced pseudorandomized lists via the Latin square design, so that there were at least two fillers between any two items. The sentences were presented in a self-paced reading paradigm with moving window presentation (Haberlandt 1994).

In order to keep the sentences parallel, the old items (149a) and (149b) needed to be adjusted by removing the meta-communicative phrase *und zwar* '(and) namely'. This phrase was used as a preview interest area in the eye-tracking study and was unnecessary in the present paradigm, because the participants read the critical interest areas in isolation. Furthermore, retaining *und zwar* would lead to very marked if not completely unacceptable sentences in conditions where the conjunctions appeared at the start of the sentence.

The new conditions (149c) and (149d) differed from the existing ones only in word order. Here, the conjunctions were moved to the front of the sentence, so that they could be processed without semantic and pragmatic intrusion. The control conditions from the previous study were also retained. Their purpose was to offset the reading time latencies stemming from the differences in word length between the two conjunctions.

The item and control sentences were divided into six or seven interest areas, depending on their length, corresponding to the presentation in Figure 8.2. Similarly, the filler sentences were divided into six to eight segments. All experimental materials were in the preterite tense.

IA 1	IA 2	IA 3	IA 4	IA 5	IA 6	IA 7
------	---	-----------	----	--- ------	--- ---	------- ------
Sophie	---	-----------	----	--- ------	--- ---	------- ------
------	war	-----------	----	--- ------	--- ---	------- ------
------	---	freundlich,	----	--- ------	--- ---	------- ------
------	---	-----------	weil	--- ------	--- ---	------- ------
------	---	-----------	----	die Eltern	--- ---	------- ------
------	---	-----------	----	--- ------	sie gut	------- ------
------	---	-----------	----	--- ------	--- ---	erzogen haben.

Figure 8.2: Stimuli presentation in Experiment 6. Each line represents the sentence presentation following a key press. IA = interest area.

(149) a. Sophie war freundlich, um die Eltern stolz auf sie zu machen.
Sophie was friendly in.order the parents proud of her to make
'Sophie was friendly to make the parents proud of her.'

b. Sophie war freundlich, weil die Eltern sie gut erzogen haben.
Sophie was friendly because the parents her good raised have
'Sophie was friendly, because the parents raised her well.'

c. Um die Eltern stolz auf sie zu machen, war Sophie freundlich.
in.order the parents proud of her to make was Sophie friendly
'To make the parents proud of her, was Sophie friendly.'

d. Weil die Eltern sie gut erzogen haben, war Sophie freundlich.
because the parents her good raised have was Sophie friendly
'Because the parents raised her well, was Sophie friendly.'

Predictions

The predictions for the first two conditions (149a) and (149b) are the same as in the previous experiments. Under the Coercion Account, there should be a conflict between the stative *be* and the agentive conjunction *um... zu* in (149a), necessitating a reinterpretation of the main clause from a state into an activity. By contrast, there should be no conflict between the main clause and *weil* in (149b), and thus no effects stemming from processing difficulty. In sum, the Coercion Account expects to observe longer reading times for (149a) compared to (149b). The predictions of the Underspecification Account are straightforward: there should be no conflict between *be* and either of the conjunctions, and therefore no processing differences between (149a) and (149b).

The predictions for the remaining two conditions (149c) and (149d) concern the conjunctions' syntax. If the syntactic differences between the two conjunctions underlie the processing delays observed in the previous experiments, then the same reading patterns should appear when the conjunctions are in sentence-initial position. Such a finding would undermine the effects previously interpreted in favor of the Coercion Account. If the processing effort is not related to the structural factors, then both conjunctions will have similar reading times. Finding no differences in these conditions would strengthen the claim that the effects observed in previous experiments were due to coercion, and thus provide evidence in favor of the Coercion Account.

Both the coercion and syntactic differences are triggered by the conjunction. Under the assumption that the conflict resolution is local and incremental, the predicted effects should emerge on the conjunction interest area and potentially on the spillover interest area immediately following it.

Procedure

The study was conducted in a quiet room with a desktop computer. A keyboard was used to navigate in the experiment, which was programmed using E-Prime 3.0 software (Psychology Software Tools Inc. 2016).

Before the start of the experiment, the participants read and agreed to an ethics statement. Subsequently, they were asked to answer general questions concerning their native languages, age, gender, handedness, and federal state or country of origin. Next, they read instructions detailing the experimental task and providing examples of an experimental trial. The participants were instructed to read normally and were encouraged to ask clarification questions. The experimental session included a break half-way through. After completing the experiment, the participants were informed about the purpose of the study.

The main experiment part was preceded by nine exercise trials. The first three sentences at the start of the experiment and after the break were fillers. All sentences were written in white letters on a dark gray background in Lucida Sans Unicode font size 20 pt.

A single trial consisted of a fixation point (*) and the sentence display, followed by a forced-choice question in 40% of the cases. The sentences were presented in increments (phrase-by-phrase), as depicted in Figure 8.2. The participants could control when each segment of the sentence was presented by pressing the space bar. Initially, the sentence was displayed entirely, with letters substituted for dashes. Once the participants pressed the space bar, the first part of the sentence appeared in place of the dashes, while the remainder of the sentence was still concealed. With each press of the space bar, a new sentence segment appeared and the previous one disappeared. The participants could move forward in the sentence but could not revisit the sentence parts they had already read. After the last segment, the trial ended with a final press of the space bar.

The question display consisted of a question with two possible answers, one on the left and one on the right, as in (138), repeated below, which followed (149). In half of the questions, the correct answer was on the right. The order of answers was reversed in two of the lists, so that the correct answers appeared equally often on either side. The participants used two predetermined keys clearly marked on the keyboard to answer the questions. There was no time limit for making the decision, but the average response times was 1866 ms. In the practice trials, feedback was provided, but not in the experimental trials.

(138) Wer oder was wurde im Satz erwähnt?
who or what was in.the sentence mentioned
'Who or what was mentioned in the sentence?'

Die Eltern	Die Geschwister
the parents	the siblings

Participants

44 native speakers of German, aged 18 to 32 (mean age 24, SD=3) were recruited for the experiment. 30 were women, 41 were right-handed, and 42 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Berlin, Hesse, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, and Thuringia. They were randomly assigned to lists (11 participants per list).

The participants had normal or corrected to normal vision. They were naïve to the purpose of the study and had not participated any of the previous experiments. As compensation, the participants received 10 EUR or course credit. An experimental session took about an hour on average (between 24 and 118 minutes). The mean correct answer rate to the comprehension questions was 98% (between 92% and 99%, SD=2%).

Analysis

The data analysis was conducted in R (R Core Team 2021). Only abnormally long reading times in relevant interest areas were removed prior to the analysis, as they could not have been the product of meaningful reading (all >1500 ms, 0.04% of the data). Reading times were log-transformed before the analysis.

8.1.2 Results

All significant effects in the critical interest areas are reported. The results are summarized in Table 8.1. Figure 8.3 provides an overview of the reading times in the whole sentences.

There was a main effect of word order on the conjunction interest area (β=0.03, SE=0.01, t=2.49, p<0.05). Sentences with conjunctions in the canonical word order were read more slowly than when the conjunctions were in anteposition. There was an analogous main effect of word order on the spillover interest area (β=0.04, SE=0.02, t=2.46, p<0.05). Here, the

Word order	Conjunction	RT conjunction (SD)	RT spillover (SD)
normal	um… zu	396 (161)	426 (225)
normal	weil	402 (169)	436 (245)
inverse	um… zu	384 (161)	441 (217)
inverse	weil	389 (162)	445 (242)

Table 8.1: Mean reading times in ms on critical interest areas (the conjunction and the spillover) in Experiment 7. RT = reading time; SD = standard deviation.

spillovers following conjunctions in the canonical order were read faster than their anteposition counterparts. There were no other effects.

8.1.3 Discussion

This experiment set out to determine whether the syntactic differences between *weil* and *um… zu* are to blame for diverging reading behavior in eye-tracking Experiments 2 and 4. Such a conclusion is not supported by the results of the present study, as evidenced by the lack of effects in reading times. Whether the subject is overt or a silent PRO seems to not influence reading latencies.

The second aim of this study was to replicate in reading times the effects interpreted in favor of coercion in the eye-tracking experiments. No coercion effects were observed in the present experiment. This could mean one of two things. Either there truly was no increase in processing difficulty, in line with the predictions of the Underspecification Account and against the Coercion Account, or alternatively, the coercion effects might be too subtle for the self-paced reading paradigm. The reinterpretation effort in the previous studies was visible in regression proportions, a measure not captured by the current method.

Overall, it appears that the effects in the previous experiments were not influenced by structural differences between the conjunctions. However, failing to find a coercion effect is problematic and there are a few other issues to consider. The observed effects were in regression proportions and not in reading times, which are the only available measure in self-paced reading. It could be that agentive coercion is too subtle for this paradigm. Furthermore, coercion could be a later effect, appearing later than expected in the sentence. If that were the case, then agentive reinterpretation would not be captured by any of the previous experiments, due to different conjunctions limiting the measurement window. Neither of these possibilities can be excluded based on the experiments so far.

One issue is becoming increasingly apparent: perhaps it is time to leave the conjunction factor behind and refocus on agentivity itself. The final two experiments of this chapter do just that, while attempting to resolve the methodological issues mentioned in the previous paragraph.

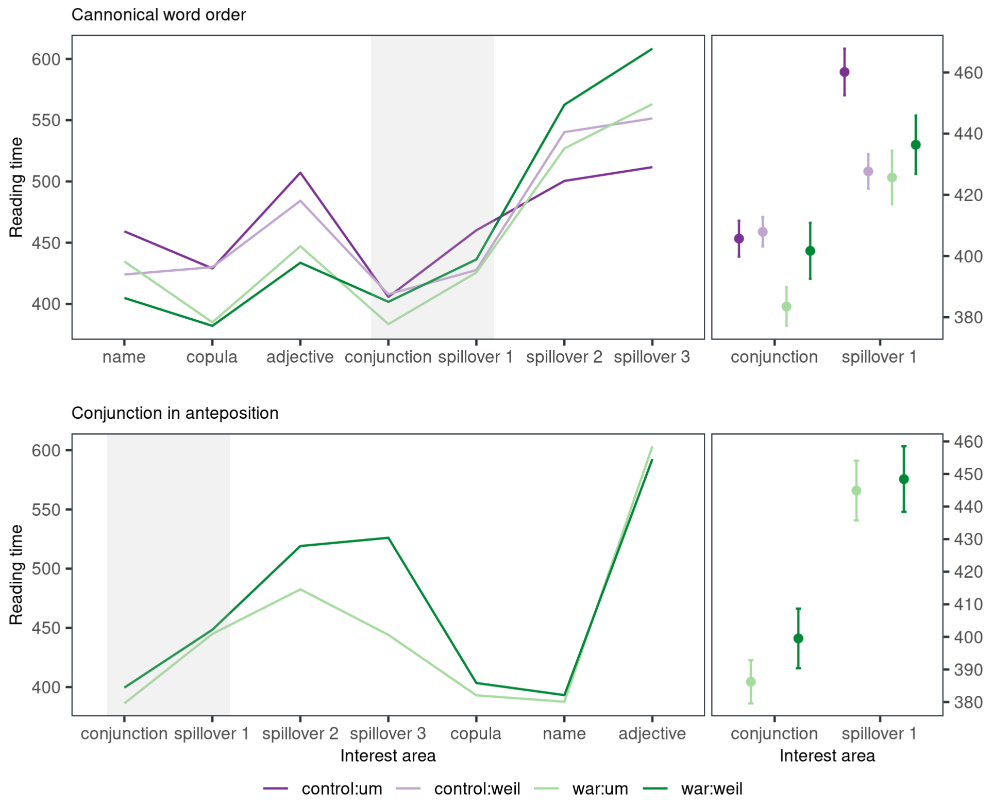


Figure 8.3: Results of Experiment 7. Durations were adjusted for word length. Error bars are standard errors of the mean and target interest areas are marked in gray.

8.2 Experiment 7: Deliberate Friendliness

The agentivity-compatibility of the stimuli in the experiments conducted so far was based on the results of Experiment 1. One goal of the present study was to replicate the agentivity score of the adjectives in a different test. Experiment 1 relied on the compatibility of adjectives with the verb ‘to act’ to measure agentivity, under the assumption that acting in a certain way requires the subject’s volitional agency. However, that is but one way of measuring agentivity. Experiment 7 aimed at (re)testing the agentivity of a large sample of adjectives by probing their compatibility with adverbs of volition or control (Brennenstuhl 1976; Buscher 2018; Scheifele and Bücking 2021).

A second goal was to confirm a selection of adjectives for the subsequent study. Experiment 8 required as one of its factors a sample of adjectives that fall into one of two groups: activity-leaning or stage-level vs. state-leaning or individual-level. The results of this experiments shed light on how agentivity in copular sentences works and how different tests for agentivity compare against one another.

8.2.1 Methods

Design

Experiment 7 was an acceptability rating study with a one-factor mixed design, similar to Experiment 1. The within-item but between-subject factor was adverb type (*absichtlich* ‘intentionally’ vs. *bewusst* ‘deliberately’ vs. *freiwillig* ‘voluntarily’). Adjectives were tested in combination with these agentivity-compatible adverbs. The random effects were item number and participant ID.

As in the previous experiment, due to the tortuously large number of sentences, 360 adjectives were tested between subjects. The adjectives were randomly assigned to one of two groups. Half of the participants saw adjectives from group one and the other half saw the adjectives from group two. Each group was then subdivided into three lists via the Latin square design. This resulted in six lists with 180 items each. Each participant saw all adjectives from one group only once and with *absichtlich*, *bewusst*, or *freiwillig*.

Materials

The materials consisted of the adjectives used in Experiment 1, as well as another 16 adjectives that I had since observed German native speakers use in the wild. Two example items—one from each group—in three conditions are presented in (150). In Experiment 1, the adjective *friendly* was rated 5.8 out of 7, whereas *stylish* was rated 2.0 out of 7 for naturalness with the verb ‘to act’.

The subject of the sentence was always a named individual and the verb was the copula. The subjects were in equal amounts typically female and male names, as well as one unisex one. The names appeared only once per item in each adjective group. The subjects in the filler sentences were also in equal proportions traditionally female or male names, but could also be nouns, such as *das Boot* 'the boat'. The verbs were different and there was never a copula. A few names were repeated once. This was a trade-off due to the large amount of sentences and the desire to avoid using highly unusual names. All sentences were in the preterite tense.

(150) a. Sophie war absichtlich / bewusst / freiwillig freundlich.
Sophie was intentionally / deliberately / voluntarily friendly

b. Sophie war absichtlich / bewusst / freiwillig modisch.
Sophie was intentionally / deliberately / voluntarily stylish

Another 260 distractor sentences were added to the items. Of these, 190 were natural and 70 contained world knowledge or semantic violations. The lists were pseudorandomized so that there was at least one filler between any two items.

Predictions

Predicates that are highly compatible with the adverbs 'intentionally', 'deliberately', and 'voluntarily' are ones where the subject can exert some form of volitional involvement or control over the event which they express. Therefore, such adjectives should be compatible with an agentive interpretation of the copula. The acceptability ratings should reflect this tendency. Agentivity-compatible adjectives ought to receive higher ratings than agentivity-incompatible ones.

If agentivity is robust and stable across environments, then the results of this experiment should be in line with the ratings in Experiment 1. If instead agentivity is a much fickler phenomenon and depends on the current circumstances, then the results will differ. Both findings would be instructive in terms of comparing not only the tests but also speaker intuitions.

Lastly, the results of this study in tandem with the ones from Experiment 1 will guide the selection of individual-level adjectives for the sentence material in the subsequent experiment.

Participants

60 native speakers of German, aged 18 to 58 (mean age 25, SD=7) were recruited for the experiment. 49 were women, 52 were right-handed, and 51 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Berlin, Hesse, Lower Saxony, Mecklenburg-Western Pomerania, North Rhine-Westphalia, Rhineland-Palatinate, and Schleswig-Holstein. The participants were randomly assigned to lists (10 participants per list, 30 participants per adjective). They were naïve to the purpose of the study and had not participated any of the previous experiments. Those who gave higher ratings to unnatural fillers than to natural fillers or had an average difference of ≤ 1.5 between the filler types were excluded from the analysis. This affected three participants, who were

Figure 8.4: Stimuli presentation in Experiment 7.

replaced by new recruits. The study was followed by an unrelated experiment. The participants received 12 EUR as compensation or course credit for completing both experiments.

Procedure

The study had the form of an online questionnaire and was programmed in PCIbex (Zehr and Schwarz 2018). The participants completed the questionnaire from their own computer or mobile device over the internet. The overall procedure and stimuli presentation were equivalent to that in Experiment 1.

The participants were instructed to read the sentences and rate their naturalness on a seven-point Likert scale (Likert 1967) from 1 (*sehr unnatürlich* 'very unnatural') to 7 (*sehr natürlich* 'very natural') by clicking on the appropriate number or pressing a number key between 1 and 7 on the keyboard. Only one sentence was presented per slide. The sentences and the scale were presented simultaneously, as illustrated in Figure 8.4. The next trial was started automatically after an acceptability judgment was made and the participants could not revise their decision.

Before the start of the experiment, the participants read and agreed to an ethics statement. Subsequently, they were asked to answer general questions concerning their native languages, age, gender, handedness, and federal state or country of origin. Next, they read instructions detailing the experimental task and providing examples of an experimental trial. Then, they trained the task on nine exercise sentences, before moving to the main sequence. At the end of the experiment they read an explanation of the purpose of the study. The whole study took 32 minutes on average (between 13 and 140 minutes).

8.2.2 Analysis and Results

The data analysis was conducted in R (R Core Team 2021). The results are summarized in Tables 8.2 and 8.3. The full list of adjectives and their ratings is provided in Appendix F.

Bewusst 'deliberately' was rated best of the three adverbs, followed by *absichtlich* 'intentionally' ($t_1[59]=-5.48$, $p<0.01$, 95% CI: -0.17, -0.08; $t_2[359]=-7.28$, $p<0.01$, 95% CI: -0.16, -0.09), and finally *freiwillig* 'voluntary'

Condition	Mean rating	SD	Min	Max
absichtlich	2.99	1.90	1	7
bewusst	3.31	1.99	1	7
freiwillig	2.53	1.71	1	7
unnatural filler	2.27	1.79	1	7
natural filler	6.51	1.09	1	7

Table 8.2: Mean acceptability judgments for sentences in Experiment 7. SD = standard deviation.

($t_1[59]=7.55$, $p<0.01$, 95% CI: 0.14, 0.24; $t_2[359]=9.23$, $p<0.01$, 95% CI: 0.15, 0.23). Natural fillers were rated at ceiling, whereas unnatural ones were rated worse than the lowest rated adverb ($t_1[59]=-2.53$, $p<0.05$, 95% CI: -0.22, -0.03; $t_2[69]=-2.43$, $p<0.05$, 95% CI: -0.30, -0.03).

The adjectives' naturalness ratings formed a continuum from very low acceptability (e.g. *verwaist* 'orphaned', mean overall rating 1.2) to high acceptability (e.g. *leise* 'quiet', mean overall rating 5.3). There were differences between the adjectives in their compatibility with the adverbs (all mean ratings ≥ 6). *Absichtlich* was most compatible with *höflich* 'polite', *ironisch* 'ironic', and *vorsichtig* 'careful', while *bewusst* was most compatible with *freundlich* 'friendly' and *sparsam* 'thrifty'. *Freiwillig* was highly compatible only with *geimpft* 'vaccinated'.

8.2.3 Discussion

The results revealed significant differences between the adverbs. The addition of *bewusst* 'deliberately' caused more adjectives to be perceived as natural, while the addition of *freiwillig* 'voluntarily' caused the most rejections. *Absichtlich* 'intentionally' formed the middle ground. This indicates that a few characteristics can be manipulated consciously, but intentionally one can only do so much. Voluntary actions are severely limited in comparison.

The adjectives' ratings are on an acceptability continuum, much like in Experiment 1, but the present study yielded much lower ratings overall. There were no adjectives rated ≥ 6 out of 7 on average, whereas in the previous experiment there were 11 such adjectives. Furthermore, the only adjective which was rated over 5 in both experiments was *freundlich* 'friendly'.

In Experiment 1, *sich verhalten* had a mean rating of 3.7 (SD=2.3), which is closest to that of *bewusst* (mean 3.3, SD=2.0), although still higher. There was little overlap between highly rated adjectives with *sich verhalten* and the adverbs in the present study, as summarized in Table 8.3. *Sich benehmen* (mean rating 3.3, SD=2.2) was rated much like *bewusst*. Of the three, *bewusst* shared most adjectives with the verbs from the previous experiment, though this may be due to the fact that it was rated best of all the adverbs.

In sum, it appears that there is quite a difference between the ways we control our characteristics. Behaving a certain way, acting consciously, intentionally, and voluntarily all evoke different kinds of control. The assumption that both agentivity tests from the present study and Experiment 1 yield the same results was not borne out. The adjectives compatible with *acting* did

	sich verhalten		*sich benehmen*	
Adjective	Rated ≥ 5	Rated ≤ 2	Rated ≥ 5	Rated ≤ 2
absichtlich	11	27	6	35
bewusst	14	25	12	34
freiwillig	0	27	0	39

Table 8.3: Overlap between acceptability judgments in Experiments 1 and 7.

not overlap in any meaningful way with those compatible with the adverbs of control, although both experiments found a gradual continuum of agentivity. Most similarities were in the rejections, calling into question whether both tests probed the same properties. This is an important point to consider, as this result goes against both native speaker intuitions and assumptions made in the literature on agentivity. Empirical testing of theories is, therefore, a necessary and crucial step in evaluating theories.

Finally, the results of this experiment were weighed against the results of Experiments 1 and 3 with the goal of optimizing the sentence materials for the next study.

8.3 Experiment 8: Standing in the Way of Control

This experiment departed from the conjunction type factor altogether and focused on copular sentences in agentive constructions. Copular sentences were combined with stage-level and individual-level adjectives in the main clause, creating a minimal pair of Sophia's friendliness and giftedness. The copular clauses later composed with subordinate clauses headed by the agentive conjunction *um… zu* 'in order to'. The goal was to contrast obligatorily stative copular sentences with ones where an agentive interpretation is possible either compositionally or through reinterpretation.

This experiment is important for several reasons. It is a partial replication of Experiment 6 in that both two of the conditions in both experiments are the same, as is the self-paced reading paradigm. Furthermore, the task in this study was different from the previous ones. The participants read sentences and are required to assess their sensicality. The looming sensicality question could influence the participants' reading strategies, e.g. by having them cease to read a sentence once they have decided that it cannot make sense, irrespective of how it continues. In these cases, they do not need to continue reading. Previously, the participants answered comprehension questions, which targeted the entire sentence. Even if it was semantically or pragmatically aberrant, the participants were forced to read carefully until the end of the sentence.

Moreover, the entire sentence could be compared between the conditions in the current experiment, because from the adjective on, all conditions within one item continued in the same way. This could reveal effects in later sentence segments, beyond what was investigated in previous studies. Lastly, this experiment contained a mismatch condition which served as a way to measure sensitivity of the recorded effects. The mismatch condition was expected to show processing difficulty relative to a control condition (or show when participants abandon the sentence).

8.3.1 Methods

Design

The self-paced reading study had a 2×2 design with the within-factors adjective type (stage-level vs. individual-level) and verb type (copula vs. *sich verhalten* 'to act'). Random factors were item number and participant ID.

Materials

The experimental sentences were adapted from previous experiments. An example sentence in all four conditions is presented in (151). 60 items and 246 fillers were distributed over four pseudorandomized and counterbalanced lists via a Latin square design. There was at least one filler between any two items.

Stage-level and individual-level adjectives were combined with the copula and the verb 'to act'. The interpretation of the main clause was probed by combining it with the agentive conjunction *um... zu* 'in order to'.

(151) a. Sophie war freundlich, und zwar um die Eltern stolz auf sie zu machen.
Sophie was friendly and namely in.order the parents proud of her to make
'Sophie was friendly, namely in order to make the parents proud of her.'

b. Sophie war begabt, und zwar um die Eltern stolz auf sie zu machen.
Sophie was gifted and namely in.order the parents proud of her to make
'Sophie was gifted, namely in order to make the parents proud of her.'

c. Sophie verhielt sich freundlich, und zwar um die Eltern stolz auf sie zu machen.
Sophie behaved herself friendly and namely in.order the parents proud of her to make
'Sophie behaved friendly, namely in order to make the parents proud of her.'

d. Sophie verhielt sich begabt, und zwar um die Eltern stolz auf sie zu machen.
Sophie behaved herself gifted and namely in.order the parents proud of her to make
'Sophie behaved gifted, namely in order to make the parents proud of her.'

The stage-level and individual-level predicates were chosen based on the results of the acceptability rating studies (Experiments 1, 3, and 7). Experiment 1 tested adjectives in combination with two verbs 'to act' *sich verhalten* and *sich benehmen* to determine whether the adjectives could be easily controlled by the sentence subject. The former verb appeared to be more adequate for comparing between adjective interpretations. Experiment 3 recorded the naturalness of the existing stimuli and identified sentences which could be improved in the present study. Finally, Experiment 7 probed the acceptability of the adjectives with three adverbs (*absichtlich* 'intentionally', *bewusst* 'deliberately', and *freiwillig* 'voluntarily') in order to further assess the adjectives' agentivity. Of the three, *bewusst* behaved most like *sich verhalten*.

First, the sentences in conditions with the *um… zu* conjunction from Experiment 3 were retained and adapted in order to better their overall acceptability (conditions (151a) and (151c)). In particular, the control condition (151c) needed to be as natural as possible. Based on the previous experiment, the adjectives in these sentences were assumed to be stage-level ones.

Next, 60 individual-level adjectives were chosen based on their low agentivity ratings (between 1 and 2.5 on average) in Experiments 1 and 7. These adjectives were paired with the existing stage-level adjectives to form the mismatch conditions (151b) and (151d). Care was taken to ensure that the resulting mismatch sentences were neither ungrammatical not entirely implausible, if very unnatural. The sentences needed to be conceptually possible and there were no non sequiturs. The items were then rated independently by three student assistants and corrected for plausibility where necessary.

After the main clause, the sentences continued in the same way in all conditions within one item, as illustrated in Figure 8.5. The main clause was followed once again by the meta-communicative *und zwar* '(and) namely', which served as a buffer region between the main clause and the agentive conjunction. The conjunction interest area contained the agentive conjunction *um…* (*zu*). The last three interest areas housed the spillover and the sentence end divided into two segments. The sentence-final interest area contained only the *zu* 'to' part of the conjunction and the verb, though this could be between one and three words long (e.g. *vorzuspielen* 'to pretend', *zu machen* 'to make', *erscheinen zu lassen* 'to appear').

The sentences were divided into eight interest areas, as in Figure 8.5. The critical interest areas were the adjective and the conjunction, which is where the mismatch and potential coercion efforts were triggered. The buffer between the two and the post-conjunction interest areas were expected to potentially show spillover effects.

The filler sentences were adapted from the previous experiments with one change. 41 fillers were altered to be nonsensical in the main clause and another 41 fillers were nonsensical from the subordinate clause onwards. This was to match the items, which could have mismatches in both sentence segments. As a result, 1/3 of the filler sentences were unnatural. In order to match the items, the distractor sentences were either shortened or lengthened to make them dividable into seven or eight interest areas. As before, all sentences

IA 1	IA 2	**IA 3**	IA 4	**IA 5**	IA 6	IA 7	IA 8
------	---	-----------	--- ----	--	--- ------	----- --- ---	-- ------
Sophie	---	-----------	--- ----	--	--- ------	----- --- ---	-- ------
------	war	-----------	--- ----	--	--- ------	----- --- ---	-- ------
------	---	freundlich,	--- ----	--	--- ------	----- --- ---	-- ------
------	---	-----------	und zwar	--	--- ------	----- --- ---	-- ------
------	---	-----------	--- ----	um	--- ------	----- --- ---	-- ------
------	---	-----------	--- ----	--	die Eltern	----- --- ---	-- ------
------	---	-----------	--- ----	--	--- ------	stolz auf sie	-- ------
------	---	-----------	--- ----	--	--- ------	----- --- ---	zu machen.

Figure 8.5: Stimuli presentation in Experiment 8. Each line represents the sentence presentation following a key press. Critical interest areas are marked in bold. IA = interest area.

were in preterite tense. A full list of experimental items is in Appendix G.

Predictions

The predictions of the Underspecification Account and the Coercion Account are summarized in Table 8.4 for reading times and in Table 8.5 for sensicality judgments.

The Underspecification Account (Rothstein 1999) argues that the copula is underspecified and the adjective's properties, world knowledge, and sentence context determine the semantic specification of a copula-predicate clause. Therefore, the combination of the copula with either a stage- or individual-level predicate is equally easy. In (151a), the interpretation of the main clause is compatible with a state and an event reading due to the stage-level adjective's properties. By contrast, in (151b), the interpretation should be strongly biased toward a state reading, because the individual-level predicate is tendentiously stable. The subsequent combination with an agentive conjunction is straightforward in (151a), but in (151b) leads to a clash between the semantic properties of the adjective and the conjunction. The Underspecification Account predicts that this conflict should be visible in longer reading times on the conjunction interest area and the subsequent spillover region. The answers to sensicality questions are expected to follow from these interpretational processes. Copular sentences with a stage-level adjectives (151a) should be rated as sensical and those with individual-level adjectives (151b) should be rejected as nonsensical. In both cases, the responses should be made equally swiftly.

The Coercion Account (Maienborn 2003a) postulates that the copula is stative. The combination with both adjective types in (151a) and (151b) results in a stative main clause, because both adjectives are compatible with such an interpretation. When the stative main clause is combined with the agentive conjunction, there is a sortal mismatch in both cases. The interpretation may be recovered via coercion in (151a), but it is likely that the interpretation effort is entirely abandoned in (151b) or at least requires a profound reinterpretation. Therefore, the Coercion Account predicts longer reading times on the conjunction interest area and the subsequent spillover

	Verb	Adjective		Conjunction	
Underspecification	war	stage-level	✓	um... zu	✓
(critical conditions)	war	individual-level	✓	um... zu	✗
Coercion	war	stage-level	✓	um... zu	🗘
(critical conditions)	war	individual-level	✓	um... zu	✗
Both accounts	verhielt sich	stage-level	✓	um... zu	✓
(control conditions)	verhielt sich	individual-level	✗/ 🗘	um... zu	✗/ ✓

Table 8.4: Predictions for reading times and processing difficulty in Experiment 8 made by the Underspecification Account and the Coercion Account. ✓= no conflict, composition; ✗= conflict; 🗘 = possible reinterpretation.

region for (151b) compared to (151a). The sensicality ratings should mirror the results of the interpretational processes. The copula together with a stage-level adjective will be rated as natural, albeit less so than the control sentences. The copula and individual-level adjective pair should be rejected as nonsensical. The response times are expected to differ from those predicted by the Underspecification Account. The answers in copula and individual-level conditions (151b) should be fast and easy. However, in *be* and stage-level conditions (151a), the reinterpretation may lead to longer response times, while the readers try to make sense of the sentence.

The predictions thus far result in similar reading patterns and sensicality judgments for both theories, although the mechanisms that underlie the difference are separate. The control conditions (151c) and (151d) described below provide a potential way to differentiate between underspecification and coercion.

The predictions for the sentences in (151c) and (151d), which function as controls to the critical copular ones, are the same for both accounts. Their main purpose is twofold. One aim was for them to be a measure to ensure that the sortal conflicts between the verb and its argument are picked up by the online self-paced reading measurements.

In order to see whether the experiment picks up on semantic conflict, there was a semantic clash built in the main clause of the control condition (151d), where no issues were expected to arise in the copular sentences. Based on the acceptability judgments in Experiments 1 and 7, *sich verhalten* is compatible with stage-level but not with individual-level predicates. The combination of *sich verhalten* with a stage-level adjective is straightforward, unlike the combination with an individual-level one. In the latter case, an interpretation may be possible through coercion, but it may also fail altogether if no plausible reinterpretation is found. This preference should be reflected in reading times on the adjective itself and its adjacent interest area. Finding differences in reading time in the main clause between (151c) and (151d) would indicate that in the control conditions the online self-paced reading measures are sensitive enough to pick up the semantic conflict. In that case, the absence of effects in the critical conditions is a true null effect and not simply the results of sloppy measurement.

The second aim of the control conditions was to use them as a basis for

	Verb	Adjective	Judgment	RT
Underspecification	war	stage-level	✓	fast
(critical conditions)	war	individual-level	✗	fast
Coercion	war	stage-level	🔄	slow
(critical conditions)	war	individual-level	✗	fast
Both accounts	verhielt sich	stage-level	✓	fast
(control conditions)	verhielt sich	individual-level	✗	fast

Table 8.5: Predictions for sensicality judgments and response times in Experiment 8 made by the Underspecification Account and the Coercion Account. ✓= sensical; 🔄 = mixed; ✗= nonsensical; RT = response time.

distinguishing between the predictions of the Underspecification Account and the Coercion Account for the copular conditions. The combination of the main clause with the agentive conjunction should be effortless in the compatible control condition (151c). The Underspecification Account predicts that the copula and stage-level adjective condition (151a) together with the agentive conjunction will be processed the same way as (151c). However, the combination of the copula with the individual-level adjective and the agentive conjunction will lead to difficulties. Therefore, the Underspecification Account predicts no reading differences between (151a) and (151c) but a delay in (151b).

By contrast, the Coercion Account expects no increased processing effort in (151c), a comparatively easy reinterpretation in (151a), and a difficult if not impossible coercion in (151b). Thus, the Coercion Account predicts that purely compositional (151c) will be the easiest to process, followed by the reinterpreted (151a), and finally the mismatching (151b). In sum, both the Coercion and the Underspecification Account make varying predictions as to the reading patterns in the stage-level conditions relative to the controls.

Procedure

The experiment was programmed in PCIbex (Zehr and Schwarz 2018). The participants completed the experiment online from their own machine and used a mouse and keyboard for navigation. Before the start of the experiment, participants were asked to consent to the ethics agreement and answered general questions concerning their native languages, age, gender, handedness, and federal state or country of origin. Then, they read instructions detailing the experimental task and providing examples of an experimental trial. Subsequently, they practiced the task on nine exercise sentences, before continuing to the main experiment. In the exercise, the order of the sentences was random. In the main experiment procedure, the stimuli presentation randomly shuffled between critical items and distractor sentences. After completing the experiment, the participants were informed about the purpose of the study.

The sentences were presented in increments (phrase-by-phrase) in a self-paced reading paradigm with moving window presentation (Haberlandt 1994). Stimuli presentation is illustrated in Figure 8.5. The participants controlled when each segment of the sentence was presented by pressing the space bar.

At the beginning of a trial, an asterisk (*) appeared. After the participants pressed the space bar, the asterisk disappeared and the sentence was presented, with dashes substituting for letters. Once the participants pressed the space bar again, the first part of the sentence appeared in place of the dashes, whereas the remainder of the sentence was still concealed. Each time the participants pressed the space bar, a new sentence segment appeared and the previous one disappeared. The participants could move forward in the sentence but could not revisit parts they had already read. After the last segment, the trial ended with a final press of the space bar.

The sentence presentation was followed by a forced-choice yes or no question display. The participants were asked whether the sentence they just read made sense and used two predetermined keys to answer the questions (1 and 2) or clicked on the answer text. The answers were presented on the left and on the right of the screen. The order of the answers was counterbalanced between the lists, but within one list, the yes and no answers always remained on the same side. There was no time limit for answering the questions.

Participants

64 native speakers of German, aged 18 to 39 (mean age 24, SD=4) were recruited for the experiment. 44 were women, 53 were right-handed, and 58 were monolingual German native speakers. Participants came from the following federal states: Baden-Württemberg, Bavaria, Berlin, Hamburg, Hesse, Lower Saxony, North Rhine-Westphalia, and Rhineland-Palatinate. The participants were randomly assigned to lists (16 subjects per list). They were naïve to the purpose of the study and had not participated in the previous experiments. They received 10 EUR or course credit as compensation. Two participants admitted to not being native speakers and four did not distinguish sensicality judgments between natural and unnatural fillers ($\leq$ 85% expected judgments in the fillers compared to mean accuracy of 93%). These six participants were excluded from the analysis and replaced by new recruits. The mean response time to the sensicality questions was 1008 ms (SD=1842 ms).

Analysis

The data analysis was conducted in R (R Core Team 2021). Only abnormally short (<100ms) and long reading times in relevant interest areas were removed prior to the analysis, as they could not have been the product of meaningful reading (0.17% of the data). The same was true for the response times (<50ms and longer than 1.7 minutes, 0.05%) Reading times were log-transformed before the analysis. The analyses were mixed effect models with fixed factors *adjective type* and *verb type*. As discussed above, six interest areas were analyzed (IAs 3–8, see Figure 8.5), from which two were expected to trigger changes in reading latencies (the adjective and the conjunction interest areas).

In order to record late mismatch and reinterpretation effects, the entire subordinate clause was also analyzed. One reason for this was that the *zu* part of the *um... zu* conjunction is syntactically positioned at the end of the sentence. If the readers waited for this part of the conjunction before committing to an interpretation, the current experiment would be able to record the processing effort. However, this broad analysis carries the restriction that sentence-final effects cannot be distinguished from sentence wrap-up effects.

8.3.2 Results

Reading Times

All significant effects within the target interest areas are reported. Descriptive statistics are summarized in Table 8.6 and inferential statistics in Table 8.7. Reading times are illustrated in Figure 8.6.

There was a main effect of verb type on the adjective, as well as a marginal interaction between factors. Sentences with *sich verhalten* elicited longer reading times than the copular ones, but the difference between the adjective types was not significant.

The analysis of the buffer interest area revealed a similar main effect of verb type. Here, too, *sich verhalten* triggered longer reading times than the copula.

The conjunction interest area housed a main effect of adjective type and an interaction between the factors. This reflected the differences within the control conditions. *Sich verhalten* paired with stage-level adjectives caused longer reading times than when combined with individual-level ones ($t_1[63]=-3.02$, $p<0.01$, 95% CI: −29.24, −5.94; $t_2[59]=-3.87$, $p<0.01$, 95% CI: −26.95, −8.57).

The remaining interest areas contained the same combination of effects: main effect of adjective type, main effect of verb type and an interaction between the factors. In the control conditions, stage-level adjectives elicited longer reading times than individual-level ones (IA6: $t_1[63]=-6.33$, $p<0.01$, 95% CI: −72.54, −37.72; $t_2[59]=-5.79$, $p<0.01$, 95% CI: −75.03, −36.47. IA7: $t_1[63]=-4.43$, $p<0.01$, 95% CI: −71.26, −26.96; $t_2[59]=-4.78$, $p<0.01$, 95% CI: −70.08, −28.71. IA8: $t_1[63]=-2.36$, $p=0.02$, 95% CI: −303.91, −24.97; $t_2[59]=-2.15$, $p<0.04$, 95% CI: −314.07, −11.38). Within the copular condition, the same difference was marginal at best (IA6: $t_1[63]=-1.77$, $p=0.08$, 95% CI: −29.76, 1.77; $t_2[59]=-1.62$, $p=0.11$, 95% CI: −31.72, 3.32. IA7: $t_1[63]=-2.28$, $p=0.03$, 95% CI: −35.47, −2.36; $t_2[59]=-1.96$, $p=0.06$, 95% CI: −37.80, 0.41).

Sensicality Judgments

The sensicality judgments and response times are illustrated in Figure 8.7. The participants successfully distinguished between natural and unnatural fillers. The difference in sensicality judgments between the two groups was significant ($t_1[63]=104.53$, $p<0.01$, 95% CI: 0.84, 0.87; $t_2[59]=70.96$, $p<0.01$, 95% CI: 0.85, 0.90). However, response times did not differ between the two filler groups.

Compared to the experimental conditions, the natural fillers were rated more often as natural compared to the control condition (151c) ($t_1[63]=-5.64$,

IA	Verb	Adjective	Mean (SD)	Min	Max
3	war	stage-level	535.07 (261.20)	176	2903
3	war	individual-level	531.75 (308.22)	168	3487
3	verhielt sich	stage-level	607.11 (372.19)	103	5643
3	verhielt sich	individual-level	629.15 (392.45)	102	4208
4	war	stage-level	477.62 (157.67)	188	1694
4	war	individual-level	478.58 (174.53)	172	2134
4	verhielt sich	stage-level	498.29 (189.44)	180	2545
4	verhielt sich	individual-level	509.16 (208.89)	151	2474
5	war	stage-level	414.66 (107.59)	172	1097
5	war	individual-level	413.55 (106.57)	143	1207
5	verhielt sich	stage-level	422.29 (106.06)	167	1260
5	verhielt sich	individual-level	404.41 (110.92)	163	1278
6	war	stage-level	517.86 (241.69)	175	2726
6	war	individual-level	504.24 (205.48)	177	2284
6	verhielt sich	stage-level	514.04 (215.86)	157	2974
6	verhielt sich	individual-level	458.37 (190.81)	144	2343
7	war	stage-level	550.46 (251.85)	155	2606
7	war	individual-level	532.26 (237.37)	184	3574
7	verhielt sich	stage-level	561.74 (256.62)	164	2627
7	verhielt sich	individual-level	511.72 (237.50)	148	2256
8	war	stage-level	1029.96 (1168.29)	147	11734
8	war	individual-level	1072.30 (1467.18)	127	17647
8	verhielt sich	stage-level	1145.05 (2113.01)	161	41652
8	verhielt sich	individual-level	978.43 (1428.15)	142	27128

Table 8.6: Mean reading times in Experiment 8 in ms. IA = interest area; SD = standard deviation.

IA	Variable	Estimate	SE	df	t	p≤	95% CI
3	(intercept)	6.25	0.03	74	190.95	0.001	6.18, 6.31
3	verb	−0.13	0.01	3756	−11.50	0.001	−0.15, −0.11
3	verb×adjective	0.04	0.02	3755	1.73	0.08	−0.01, 0.08
4	(intercept)	6.15	0.02	67	295.66	0.001	6.10, 6.19
4	verb	−0.04	0.01	3753	−5.25	0.001	−0.69, −0.03
5	(intercept)	6.00	0.02	63	323.32	0.001	5.96, 6.03
5	adjective	0.02	0.01	3752	3.92	0.001	0.01, 0.04
5	verb×adjective	−0.05	0.01	3752	3.64	0.00	−0.07, −0.02
6	(intercept)	6.14	0.03	79	196.58	0.001	6.08, 6.20
6	verb	0.05	0.01	3742	5.39	0.001	0.03, 0.07
6	adjective	0.07	0.01	3742	7.43	0.001	0.05, 0.08
6	verb×adjective	−0.10	0.02	3742	−5.34	0.001	−0.13, −0.06
7	(intercept)	6.21	0.03	114	192.12	0.001	6.15, 6.28
7	verb	0.02	0.01	3743	1.68	0.09	−0.00, 0.03
7	adjective	0.06	0.01	3743	7.12	0.001	0.05, 0.08
7	verb×adjective	−0.07	0.02	3743	−3.84	0.001	−0.10, −0.03
8	(intercept)	6.63	0.05	71	124.13	0.001	6.53, 6.74
8	verb	0.03	0.02	3742	1.70	0.09	−0.00, 0.07
8	adjective	0.05	0.02	3742	2.85	0.01	0.02, 0.09
8	verb×adjective	−0.12	0.04	3742	−3.35	0.001	−0.19, −0.05

Table 8.7: Significant effects found in Experiment 8. CI = confidence interval; df = degrees of freedom; IA = interest area; SE = standard error.

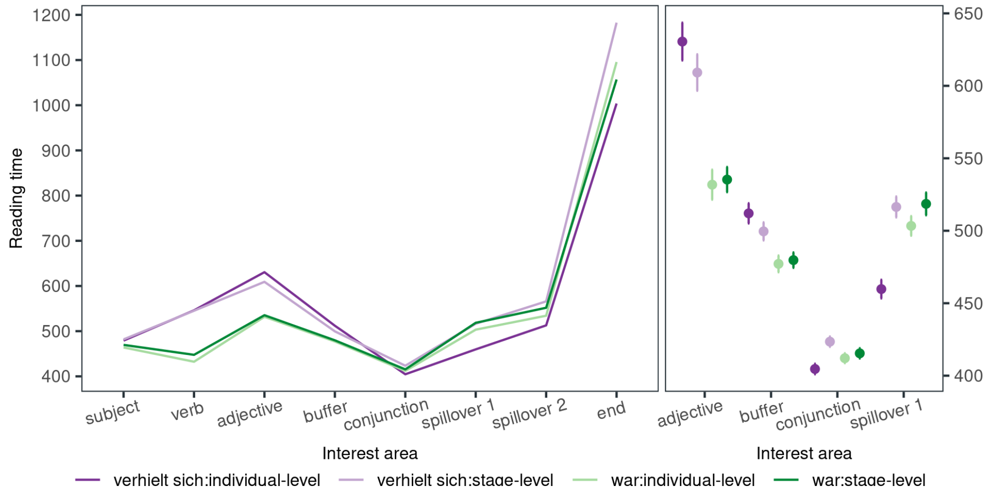


Figure 8.6: Reading times in Experiment 8. Error bars are standard errors of the mean and target interest areas are marked in gray.

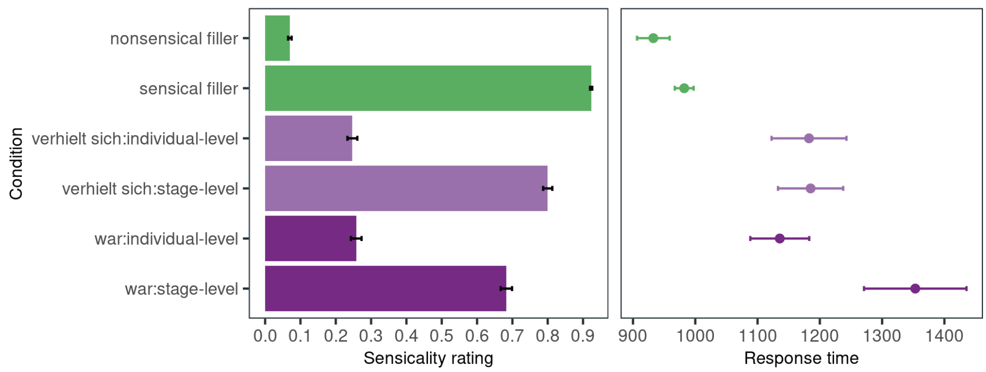


Figure 8.7: Sensicality judgments and response times in Experiment 8. Error bars are standard errors of the mean.

p<0.01, 95% CI: −0.16, −0.08; t_2[59]=−5.44, p<0.01, 95% CI: −0.19, −0.09). Unnatural fillers were rejected more frequently than the mismatch condition (151d) (t_1[63]=9.22, p<0.01, 95% CI: 0.14, 0.22; t_2[59]=6.23, p<0.01, 95% CI: 0.12, 0.23).

Within the critical conditions, the analysis of the sensicality judgments revealed main effects of verb type (β=−0.36, SE=0.08, z=−4.36, p<0.01, 95% CI: −0.52, −0.20) and adjective type (β=2.67, SE=0.09, z=29.02, p<0.01, 95% CI: 2.49, 2.85), as well as an interaction between the two factors (β= −0.81, SE=0.16, z=−4.95, p<0.01, 95% CI: −1.14, −0.49).

Individual-level adjectives were overwhelmingly rejected as nonsensical compared to stage-level ones, irrespective of verb type (|ts|<0.5). *Sich verhalten* in combination with a stage-level adjective was rated better than the copula with this adjective type (t_1[63]=5.21, p<0.01, 95% CI: 0.07, 0.16; t_2[59]=3.73, p<0.01, 95% CI: 0.06, 0.18). The analysis of the response times found no effects.

8.3.3 Discussion

I hope the reader by now is used to expecting the unexpected. In the words of Robert Burns (Burns 1786, p. 140):

> But, Mousie, thou art no thy lane,
> In proving foresight may be vain;
> The best-laid schemes o' mice an 'men
> Gang aft agley,
> An'lea'e us nought but grief an' pain,
> For promis'd joy!

The predictions for the control conditions, which were identical for both the Underspecification and the Coercion Accounts, were mostly not borne out. In the main clause, the mismatching combination of the verb 'to act' and the individual-level adjective was read as quickly as compositionally straightforward combination of 'to act' and the stage-level adjective. This indicates that the online self-paced reading paradigm, or perhaps any self-paced reading paradigm for that matter, is not sensitive enough to pick up on such a subtle conflict. Alternatively, the speakers could have been exceedingly accommodating and willing to entertain the incongruity in the hope that the subordinate clause provides the necessary context to repair the defective interpretation. The mismatch was resolved by the time the agentive conjunction was read. At that point, the participants decided that the mismatch condition was nonsensical and ceased to read any more sense into the sentence. From then on, the control condition was read more carefully than the mismatch, which was henceforth skimmed.

Curiously, the agentive conjunction, which matches the active verb, did not improve the mismatch sentence. This suggests that the adjective's semantics overpowered any repair attempt. Nevertheless, the sensicality judgments proved that the participants were reading attentively. They were quick and accurate in assessing the control conditions' sensicality.

Within the copular conditions, there were no effects in the main clause, as predicted by both the Coercion and the Underspecification Accounts. Overall, the control conditions required more interpretational effort in the main clause than the copular ones. Both the Underspecification and the Coercion Accounts expected a delay in reading times for the copula and individual-level adjective compared to the copula and stage-level adjective, triggered by the clash between the stative main clause and the active conjunction. However, there was only a very weak difference between the two in the reading times on the penultimate interest area.

The copula and individual-level adjective sentences were read faster than the copular stage-level ones, against the expected effect direction. Despite this, the copular conditions with stage-level predicates were processed more akin to the compositionally sound control condition, even though this meant that they were read more attentively that the individual-level ones. Against the predictions of the Coercion Account and in line with those of the Underspecification Account, there was no difference between the control and coercion conditions concurrent with a difference between the copular conditions. Nevertheless, the absence of strong effects must be quantified by the fact that there was no recorded mismatch in the control conditions. It could be that the measures were not sensitive enough or the conflict was too quickly resolved.

The sensicality judgments in the critical conditions corresponded to the predictions of the Coercion Account. The coercion condition's sensicality was positioned between the control condition and the copular mismatch condition. The response times did not differ across the critical conditions, in line with the predictions of the Underspecification Account. However, it could also be the case that the participants made up their mind about sensicality while reading the sentence. This conclusion is corroborated by the lack of reading time differences in the control conditions, despite their contrasting sensicality judgments.

To sum up, the results of the experiment were partially in line with the predictions of both the Underspecification and the Coercion Accounts. The predicted clash in the control conditions and the difference within the copular conditions were predominantly absent in reading times. This suggests that either the method used in the study was not sensitive enough or the effects were truly absent. The responses to the sensicality questions proved that the participants were sensitive to semantic and world knowledge violations. The judgments themselves confirm the predictions of the Coercion Account, indicating that the copular clauses are stative and the reinterpretation to an event lowers the sentences' plausibility. On the other hand, the response times are in line with the predictions of the Underspecification Account or the possibility that the participants made up their minds about the sensicality during reading. This uncertainty is, unfortunately, the persisting problem with null effects.

8.4 General Discussion

The experiments presented in this chapter filled important gaps left open by the previous ones. Experiment 6 tested the syntactic differences between the conjunctions *weil* 'because' and *um… zu* 'in order to', and assessed their role in the interpretation of copular sentences. The argument structure of the subordinate clauses headed by these conjunctions did not affect reading latencies. This finding resolves the concern that the coercion effects found in the previous experiments were due to the conjunctions' syntax rather than reinterpretation efforts. The experiment failed to find evidence of coercion in reading time. However, this could be attributed to the lack of sensitivity on the side of the self-paced reading method or the measurement area.

Experiment 7 reassessed the agentivity of the adjectives based on their compatibility with adverbs of intention and volition. The adverb *bewusst* 'deliberately' received the highest naturalness rating, followed by *absichtlich* 'intentionally', and finally *freiwillig* 'voluntarily'. There was little overlap between the adjectives which were rated high with either adverb and those rated high in Experiment 1, with the acceptability being overall better in the previous experiment. The study showed that agentivity effects are sensitive to the sentence context and vary between tests. This result underlines the importance of empirical research and hypothesis testing, as native speaker intuitions may be inaccurate. This experiment, in tandem with Experiments 1 and 3, provided the basis for the sentence material in the following study.

Experiment 8 focused in on the differences between individual-level and stage-level predicates in agentive constructions. The copula was combined with two adjective types, and evaluated relative to the verb *sich verhalten* ‘to act’. Unlike the previous experiments, this study had the benefit of comparing the entire sentence, including all post-conjunction interest areas. The reading times found no indication for coercion effects. The mismatch between the individual-level predicate and the agentive conjunction *um… zu* appeared weakly on two interest areas following the conjunction. This could mean that the eye-tracking studies, which did not record more than one post-conjunction spillover interest area and focused on early eye-tracking measures, missed some effects. It could also be that the measures in the self-paced reading experiment were not sensitive enough to capture meaning readjustment. This conclusion is corroborated by the fact that the expected mismatch was absent in Experiment 8 and casts doubt on the absence of effects in Experiment 6. Lastly, the experimental task required participants to make judgments on the sensicality of the sentences, a manipulation that likely influenced their reading strategies, compared to e.g. Experiment 6.

The sensicality judgments themselves showed that participants distinguished between natural and unnatural sentences. The copular sentences with stage-level adjectives were rated as less sensical than the compositional control condition but higher than the copula with individual-level adjectives. This difference speaks in favor of the Coercion Account, because the loss of plausibility is due to the need to coerce the stative main clause into an activity to comply with the expectations of the agentive conjunction. With the exception of this difference, the study did not find coercion effects, as predicted by the Underspecification Account.

In sum, this chapter raised some important theoretical and empirical issues, while addressing the weak points of the previous experiments. The study of agentivity in copular constructions would benefit from replicating the results of Experiment 8 in an eye-tracking study, with and without the sensicality questions, in order to fully assess the processes underlying Sophia’s friendliness and intelligence.

However, our time with Sophia is nearing its end. If the experiments presented in this chapter are any indication, Sophia appears to be friendly by nature. With a little effort, she can assume an active role given the right environment. The next chapter wraps up a few loose ends, which are somewhat orthogonal to the other experiments discussed theretofore. The final chapter sums up everything we have discovered about Sophia along the way before painting a somewhat clearer picture of what it means to be friendly.

9 A Few Loose Ends: Experiments 9 and 10

Before Sophia's friendly journey comes to a close, there is one last brief excursion that she must make. The reader may choose to skip this chapter and continue straight to the conclusion, as the experiments described below do not change the verdict on Sophia's active and passive friendliness.

With this digression comes an admission: the experiments as they are described in this thesis were not conducted in the order they are presented. Somewhere between Experiments 2 and 3 it was brought to my attention that parts of my analysis were incorrect. Because the analysis I initially calculated was flawed, the earliest conclusions were quite different from the ones presented here, which are derived from the corrected analysis. However, before this revelation I had already conducted an experiment which followed up on the—as I now know—invalid findings of Experiment 2. This in-between experiment is reported below as Experiment 9, because "Experiment 2.5" does not roll off the tongue well. The rationale behind it and stimuli also no longer fit its predecessor, but the experiment is nonetheless worth discussing.

Finally, Experiment 10 was originally a pretest for one of the earlier studies. I never followed up on it for methodological reasons. Ultimately it did not contribute much to the search for the roots of agentivity.

All sentence materials, experiment and results files, and analysis scripts are available upon request from the Tübingen Archive of Language Resources (Experiment 9: `https://hdl.handle.net/11022/0000-0007-EB3C-E`; Experiment 10: `https://hdl.handle.net/11022/0000-0007-EB3B-F`).

9.1 Experiment 9: "So" useful

Experiment 2 showed that the agentive reinterpretation of the copula requires increased cognitive effort. This effect was visible on the preview interest area in the first pass regressions. Can this coercion be facilitated by the addition of the degree modifier or intensity marker *so* ('this much' or 'in this manner')?

The German particle *so* can fulfill many heterogeneous functions, spanning from adverb, to conjunction, to quotation particle, to intensifier (Auer 2006; Golato 2000; Helbig and Buscha 2001; Wiese 2011). Hennig (2006, p. 415) identifies the following word categories *so* can fall into: an adverb (152), an intensifier particle (153), a focus particle (154), an element introducing concessives (155), and a correlate (156).

(152) Schrei nicht so in der Klasse herum.
shout not like.that in the class around
'Don't shout *like that* in class.'

(153) Am Strand ist es so laut.
at.the beach is it so loud
'It is *so* loud on the beach'

(154) Er bleibt so drei Tage in Wien.
he stays like.that three days in Vienna
'He stays in Vienna *like that* for three days.'

(155) So wichtig Fakten (auch) sind, ohne eine ausreichende Theorie
as important facts (also) are without a sufficient theory
sind sie wertlos.
are they worthless
'*As* important *as* facts are, they are worthless without sufficient theory.'

(156) Es ist heute so warm, als wäre es Sommer.
it is today as warm as.if were it summer
'It is *as* warm today as if it were summer.'

In copular sentences, the addition of *so* to constructions such as *Sophia war so freundlich* 'Sophie was so friendly' adds either an evaluative or degree component to Sophie's behavior. In both interpretations, *so* must be stressed. In the degree interpretation, Sophia is controlling the level of friendliness, possibly in order to achieve a goal. She can modify the intensity of her friendliness at will. This interpretation can be paraphrased as (157a). Alternatively, Sophia is perhaps a person who typically behaves in an extraordinarily friendly manner. This interpretation can be paraphrased as (157b). Here, *so* is used primarily for emphasis.

(157) a. Sophia was this friendly (not any more or less)/friendly to such a degree.
b. Sophia was unbelievably/totally friendly.

It is impossible to distinguish between both interpretations for *Sophia war so freundlich* in (157) through prosody and semantics of modification alone, without the addition of sentence or conversation context and position (Auer

IA 1	IA 2	IA 3	*IA 4*	*IA 5*	*IA 6*	IA 7
Name	verb (so)	adjective	*preview*	*conjunction*	*spillover*	sentence end.

Table 9.1: Item segmentation into invisible interest areas in Experiment 9. Critical interest areas are marked in cursive.

2006). However, this distinction is not necessary for the purpose at hand, as long as both interpretations bring focus to the adjective.

Focused information is treated preferentially in processing. It is more likely to attract attention (Hornby 1974), is processed faster (Birch and Rayner 2010; Chen et al. 2012), and is better memorized (Sanford et al. 2009) compared to non-focused information. Focus facilitates the recognition of false information (Bredart and Modolo 1988) and anaphora resolution (Almor 1999; Foraker and McElree 2007; Klin et al. 2004). Furthermore, recall that Lowder and Gordon (2015) show that syntactic focus reduces the magnitude of complement coercion. Bringing attention to Sophia's friendliness is instructive to manipulating the event or state interpretation of the copular construction.

The central aim of this eye-tracking during reading study was to investigate the robustness of the agentive coercion effect found in Experiment 2. The secondary goal was to investigate whether the addition of *so* to simple copular sentences influences the availability of an activity interpretation.

9.1.1 Methods

Design

This eye-tracking during reading study had a 2×2 design (counterbalanced within-item and within-subject) with factors conjunction type (*um… zu* 'in order to' vs. *weil* 'because') and verb type (copula *sein* vs. *sich verhalten* 'to act'). The random factors were item number and participant ID.

Materials

The materials consisted of the same sentences as in Experiment 2 with one crucial change: the copular sentences contained *so* between the verb and the adjective, as in (158a) and (158b). Conditions (158c) and (158d) were identical to the ones in Experiment 2. They were added to control (with limited success) for the differences in word length between the conjunctions. Furthermore, a handful of typos was corrected in the filler and exercise sentences. The invisible sentence segmentation was modified to accommodate *so*, as in Table 9.1.

In the experimental materials, *so* functioned syntactically and semantically as an intensifier or a focus particle (Burkhardt 1987; Thurmair 2001; Wiese 2011). The sentences were never of the type *so… wie* 'as… as', *so… dass* 'so… that', or *so… als* 'as… if'. These interpretations were blocked by the addition of *und zwar* '(and) namely' after the *so*-containing main clause and in the position where *wie*, *dass*, and *als* should appear.

(158) a. Sophie war so freundlich, und zwar um die Eltern stolz auf sie zu machen.
Sophie was so friendly and namely in.order the parents proud of her to make
'Sophie was so friendly, namely to make the parents proud of her.'

b. Sophie war so freundlich, und zwar weil die Eltern sie gut erzogen haben.
Sophie was so friendly and namely because the parents her good raised have
'Sophie was so friendly, namely because the parents raised here well.'

c. Sophie verhielt sich freundlich, und zwar um die Eltern stolz auf sie zu machen.
Sophie behaved herself friendly and namely in.order the parents proud of her to make
'Sophie behaved friendly, namely to make the parents proud of her.'

d. Sophie verhielt sich freundlich, und zwar weil die Eltern sie gut erzogen haben.
Sophie behaved herself friendly and namely because the parents her good raised have
'Sophie behaved friendly, namely because the parents raised her well.'

Predictions

If *so* in sentences like (158a) carries an activity-promoting interpretation, and thereby contributes to an agentive meaning of a phrase, then the coercion effect found Experiment 2 should be absent. In other words, the differences between copular sentences with *um... zu* and *weil* should vanish or be less pronounced. However, if *so* does not contribute to the agentivity of a sentence, then the study should replicate the results of Experiment 2. The agentive interpretation of (158a) should elicit more first pass regressions from the preview interest area in (158a) compared to (158b).

Given these two possibilities, both the Coercion and Underspecification Accounts need to accommodate the possible influence of *so*. According to the Underspecification Account, if *so* contributes to the agentivity of the copular main clause, then the specification to an agentive interpretation begins at the end of the main clause. A combination with the agentive conjunction *um... zu* will be unproblematic. If the main clause is not already specified by *so*, then the specification to an agentive interpretation is equally effortless. In either case, there should be no visible effects.

The Coercion Account argues that the copula is stative. The addition of *so* could trigger coercion in the main clause. This reinterpretation would be undetectable in the present paradigm, as the analysis takes into consideration only the interest areas following the main clause. However, in the previous study, the coercion effect was visible after the main clause, and hence some echoes of coercion could be observable after the main clause has been read. Thus, the Coercion Account can explain both the presence and the absence of processing difficulty in the present experiment.

Participants

40 native speakers of German, aged 18 to 42 (mean age 24, SD=5) were recruited for the experiment. 26 were women, 38 were right-handed, and 35 were monolingual German native speakers. They were randomly assigned to lists (10 participants per list). The participants came from the following federal states: Baden-Württemberg, Bavaria, Berlin, Bremen, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saxony, and Saxony-Anhalt. One participant reported being a native speaker but grew up in Spain. The right eye was tracked for 24 participants.

The participants had normal or corrected to normal vision. They were naïve to the purpose of the study, had not participated in the previous experiment, and received 10 EUR as compensation. The mean correct answer rate to comprehension questions was 98% (between 94% and 99%, SD=1%). Furthermore, only data from participants who successfully completed the reading span task and answered correctly to at least 85% of the comprehension questions were used in the analysis. As a result, six participants were excluded from the analysis and were subsequently replaced.

Procedure and Analysis

The procedure, data preparation, and analysis were the same as in Experiments 2, 4, and 5; see Figure 6.2. After the eye-tracking part of the experiment, the participants completed a reading span task (Rummel et al. 2017). The experiment took about an hour on average (between 45 and 90 minutes).

The data was preprocessed with the SR Research EyeLink Data Viewer and the analysis was conducted in R (R Core Team 2021). Overall, 0.3% of fixations were removed from the analysis and 0.1% were merged during preprocessing. Only three interest areas were examined: the spillover region *und zwar*, which immediately precedes the conjunction interest area (IA 4), the conjunction interest area itself (IA 5), and the spillover region immediately following the conjunction (IA 6). Exceedingly long fixations in those interest areas were removed before the analysis (0.04% of fixations).

9.1.2 Results

All significant effects within the target interest areas are reported. Descriptive statistics are summarized in Table 9.2 and inferential statistics in Table 9.3. Reading times and regressions are illustrated in Figure 9.1.

First pass duration: There was a main effect of conjunction type as well as an interaction between the factors on the conjunction interest area. Sentences with *weil* were read longer than those with *um... zu*. However, this difference was due to the fact that in the *sich verhalten* control conditions *weil* elicited longer reading times than *um... zu* ($t_1[39]=-2.72$, $p<0.01$, 95% CI: -0.11, -0.02; $t_2[58]=-2.36$, $p<0.05$, 95% CI: -0.10, -0.01). The main effect of conjunction type was visible on the following spillover area as well, with *weil* triggering longer reading times than *um... zu*.

First fixation duration: The preview and the conjunction interest areas housed a main effect of verb type akin to the one in the first pass durations. The conjunction *weil* lead to longer fixations than *um... zu*. The interaction between the factors appeared on the conjunction and spillover interest areas. As in the first pass durations, *weil* caused longer fixations than *um... zu* in conditions with *sich verhalten* (IA 5, marginal: $t_1[39]=-2.30$, $p<0.03$, 95% CI: -0.10, -0.01; $t_2[58]=-2.15$, $p<0.04$, 95% CI: -0.09, -0.00. IA 6: $t_1[39]=-2.22$, $p<0.03$, 95% CI: -0.06, -0.00; $t_2[59]=-3.19$, $p<0.01$, 95% CI: -0.06, -0.01).

Regression path duration: The interaction between the factors on the preview interest area revealed that in copular sentences *um... zu* triggered longer regressions than *weil* ($t_1[38]=2.93$, $p<0.01$, 95% CI: 0.03, 0.15; $t_2[59]=2.49$, $p<0.02$, 95% CI: 0.01, 0.11). On the following two interest areas, participants launched longer regressions when reading *weil* compared to *um... zu* (main effects of conjunction type). There was a marginally significant interaction between the factors on the spillover interest area. The verb *sich verhalten* together with *weil* lead to longer re-reading than when it was combined with *um... zu* ($t_1[39]=-3.54$, $p<0.01$, 95% CI: -0.16, -0.04; $t_2[59]=-3.62$, $p<0.01$, 95% CI: -0.16, -0.05).

First pass regression ratios: There was a significant main effect of verb type and an interaction between the factors on the preview interest area. The main effect of conjunction type was marginally significant. These effects were due to the copular sentences with *weil* triggering fewer regressions than when combined with *um... zu* ($t_1[38]=2.10$, $p<0.05$, 95% CI: 0.00, 0.06; $t[59]=3.70$, $p<0.01$, 95% CI: 0.01, 0.05). In contrast, the analysis of the spillover interest area revealed a main effect of conjunction type with *weil* causing more regressions than *um... zu*. On closer inspection, this effect was caused by the difference between the conjunctions in the control conditions ($t_1[39]=-2.28$, $p<0.05$, 95% CI: -0.07, 0.00; $t_2[59]=-2.29$, $p<0.05$, 95% CI: -0.07, 0.00).

Reading span task: The mean accuracy on the reading span task was 96.7% (min=89%, max=100%). The mean partial reading span score was 57.6 (SD=9.6, min=30, max=75). The participants were once again divided into two groups based on their reading span score: lower reading span group ≤ 60, and high reading span group > 60 (23 and 17 participants, respectively). The reading span did not interact in any meaningful way with the experimental factors.

9.1.3 Discussion

The first aim of this experiment was to replicate the results of Experiment 2. A comparison between the effects in both experiments is presented in Table 9.4. Crucially, the effect interpreted in favor of the Coercion Account on the preview interest area in first pass regression ratios was visible in the

IA	Verb	Conjunction	Mean (SD)	Min	Max
First pass duration					
5	war so	um... zu	233.96 (71.92)	79	652
5	war so	weil	233.32 (80.61)	112	629
5	verhielt sich	um... zu	219.85 (65.07)	82	569
5	verhielt sich	weil	234.37 (87.07)	84	752
6	war so	um... zu	313.81 (157.34)	95	1354
6	war so	weil	325.47 (170.93)	81	1419
6	verhielt sich	um... zu	302.64 (148.41)	85	1328
6	verhielt sich	weil	324.39 (165.93)	112	1342
First fixation duration					
4	war so	um... zu	218.11 (56.06)	86	644
4	war so	weil	219.04 (55.98)	93	556
4	verhielt sich	um... zu	216.70 (57.10)	81	651
4	verhielt sich	weil	224.43 (57.73)	83	567
5	war so	um... zu	228.11 (70.52)	65	652
5	war so	weil	225.74 (67.98)	112	629
5	verhielt sich	um... zu	218.99 (63.87)	82	569
5	verhielt sich	weil	230.17 (79.29)	84	679
6	war so	um... zu	217.95 (67.06)	95	674
6	war so	weil	215.49 (67.34)	81	668
6	verhielt sich	um... zu	212.09 (59.75)	81	700
6	verhielt sich	weil	220.20 (64.97)	92	607
Regression path duration					
4	war so	um... zu	287.84 (155.27)	91	1091
4	war so	weil	261.99 (111.66)	93	922
4	verhielt sich	um... zu	277.42 (130.53)	81	987
4	verhielt sich	weil	280.70 (128.95)	104	1008
5	war so	um... zu	231.85 (96.14)	100	833
5	war so	weil	254.19 (106.82)	112	919
5	verhielt sich	um... zu	233.89 (92.42)	82	891
5	verhielt sich	weil	251.18 (105.73)	84	761
6	war so	um... zu	354.25 (204.55)	106	1732
6	war so	weil	374.74 (235.63)	84	1715
6	verhielt sich	um... zu	331.05 (196.06)	85	1677
6	verhielt sich	weil	371.38 (229.46)	128	1874
First pass regression ratios					
4	war so	um... zu	0.05 (0.22)	0	1
4	war so	weil	0.02 (0.13)	0	1
4	verhielt sich	um... zu	0.05 (0.21)	0	1
4	verhielt sich	weil	0.05 (0.23)	0	1
6	war so	um... zu	0.10 (0.30)	0	1
6	war so	weil	0.10 (0.31)	0	1
6	verhielt sich	um... zu	0.07 (0.26)	0	1
6	verhielt sich	weil	0.11 (0.31)	0	1

Table 9.2: Mean differences between conditions in Experiment 9. Durations are in ms, first fixation durations and first pass reading times are adjusted for conjunction length. IA = interest area; SD = standard deviation.

IA	Variable	Est.	SE	df	t/z	p≤	95% CI
First pass duration							
5	(intercept)	5.39	0.03	61.59	200.97	0.00	5.34, 5.45
5	conjunction	−0.05	0.02	1082.20	−2.38	0.02	−0.10, −0.01
5	verb×conjunction	0.07	0.03	1081.87	2.15	0.03	0.01, 0.13
6	(intercept)	5.64	0.04	69.20	156.27	0.00	5.57, 5.71
6	conjunction	−0.04	0.02	2135.30	−2.40	0.02	−0.07, −0.01
First fixation duration							
4	(intercept)	5.36	0.02	39.20	281.90	0.00	5.32, 5.39
4	conjunction	−0.02	0.01	1791.58	−2.05	0.04	−0.04, 0.00
5	(intercept)	5.38	0.03	62.06	209.35	0.00	5.33, 5.43
5	conjunction	−0.05	0.02	1083.32	−2.10	0.04	−0.09, 0.00
5	verb×conjunction	0.06	0.03	1083.00	1.81	0.07	0.00, 0.11
6	(intercept)	5.34	0.02	41.16	280.29	0.00	5.30, 5.38
6	verb×conjunction	−0.04	0.02	2140.13	−2.17	0.03	−0.08, 0.00
Regression path duration							
4	(intercept)	5.53	0.03	41.81	187.96	0.00	5.48, 5.59
4	verb×conjunction	−0.07	0.03	1779.32	−2.25	0.02	−0.13, −0.01
5	(intercept)	5.45	0.03	43.73	164.62	0.00	5.39, 5.52
5	conjunction	−0.06	0.03	112.89	−2.36	0.02	−0.12, −0.01
6	(intercept)	5.73	0.04	69.06	148.48	0.00	5.66, 5.81
6	conjunction	−0.07	0.02	2131.62	−3.63	0.01	−0.10, −0.03
6	verb×conjunction	−0.07	0.04	2131.48	−1.90	0.06	−0.14, 0.00
First pass regression ratios							
4	(intercept)	−3.54	0.22		−16.26	0.00	−4.01, −3.15
4	verb	−0.55	0.26		−2.11	0.04	−1.09, −0.05
4	conjunction	−0.44	0.26		−1.68	0.09	−0.97, 0.06
4	verb×conjunction	−1.22	0.52		−2.33	0.02	−2.29, −0.22
6	(intercept)	−2.71	0.21		−13.17	0.00	−3.11, −2.31
6	conjunction	0.29	0.15		1.96	0.05	0.00, 0.59

Table 9.3: Significant effects found in Experiment 9. Logit mixed-effect model for regression ratios, linear mixed-effect models otherwise. CI = confidence interval; df = degree of freedom; Est. = estimate; IA = interest area; SE = standard error.

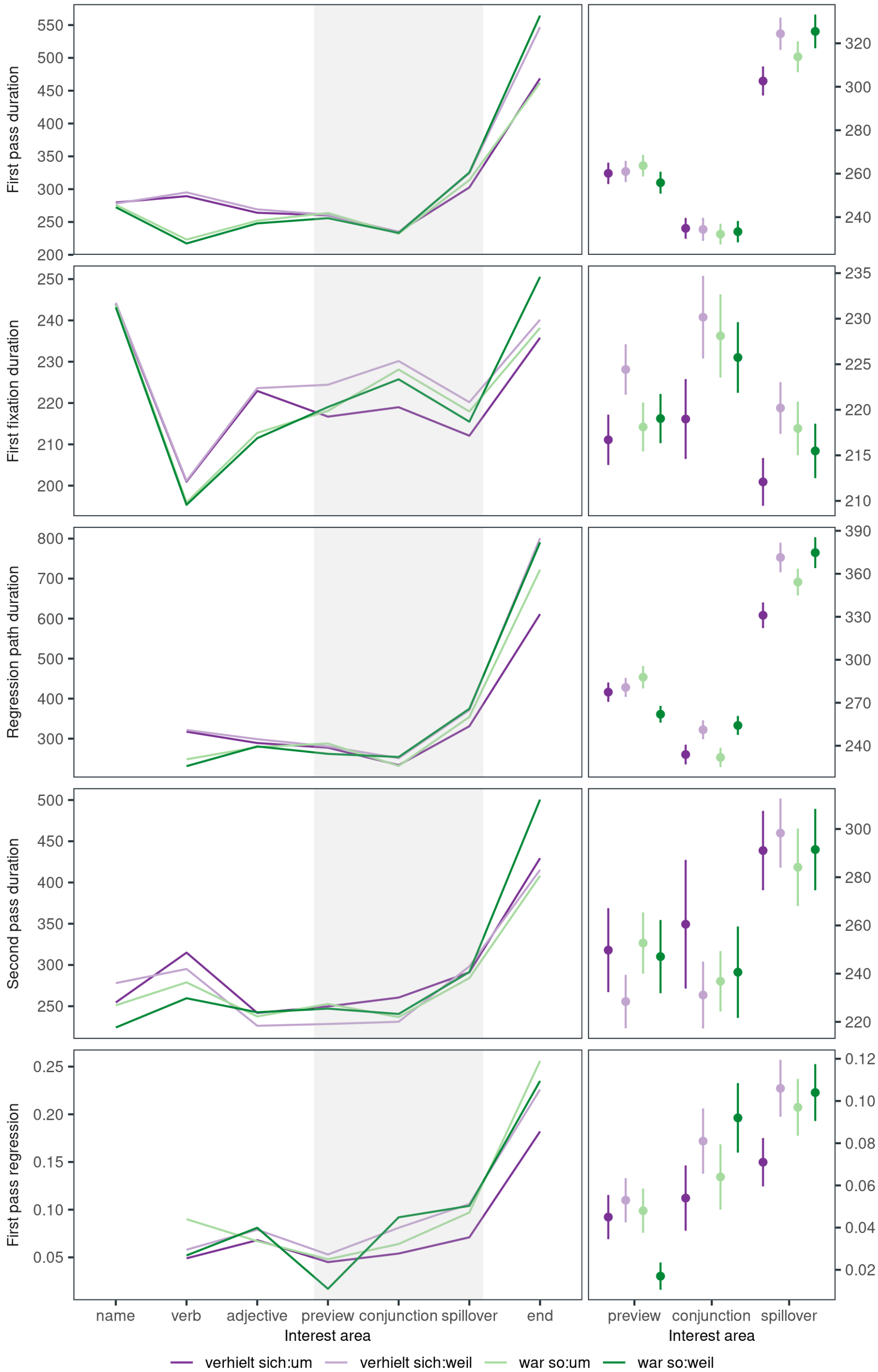


Figure 9.1: Results of Experiment 9. Durations were adjusted for word length, but regression proportions were not. Error bars are standard errors of the mean and target interest areas are marked in gray.

IA	Experiment 2	Experiment 9	Results
First pass duration			
5	*war > verhielt sich*	*weil > um... zu*	✗
5	*verhielt sich+weil > verhielt sich+um... zu*	*verhielt sich+weil > verhielt sich+um... zu*	✓
6	*weil > um... zu*	*weil > um... zu*	✓
First fixation duration			
5	*war > verhielt sich*	*weil > um... zu*	✗
5	*verhielt sich+weil > verhielt sich+um... zu*	*verhielt sich+weil > verhielt sich+um... zu*	✓
6	—	*verhielt sich+weil > verhielt sich+um... zu*	✗
Regression path duration			
4	—	*war+um... zu > war+weil*	✗
5	*war > verhielt sich*	—	✗
5	*weil > um... zu*	*weil > um... zu*	✓
6	*war > verhielt sich*	—	✗
6	*weil > um... zu*	*weil > um... zu*	✓
First pass regression ratios			
4	*war+um... zu > war+weil*	*war+um... zu > war+weil*	✓
5	*weil > um... zu*	—	✗
6	*weil > um... zu*	*weil > um... zu*	✓

Table 9.4: Comparison of effects between Experiments 2 and 9. — = no effect; ✓= same result; ✗= different result.

present experiment. Moreover, the experiment found longer go-past times on the preview interest area for copular sentences with the agentive conjunction. This result is in line with the reinterpretation predicted by the Coercion Account and goes against the predictions of the Underspecification Account. The coercion effects observed in this experiment were present on the preview interest area, which was unaffected by the correction for word-length differences between the conjunction.[1]

The second aim was to investigate the influence of the focus or intensifier particle *so* on the interpretation of copular agentive sentences. The addition of *so* does not seem to have facilitated an agentive interpretation of the copular phrase. In fact, the present experiment found an additional coercion-like effect, which was absent in Experiment 2. This is contrary to the assumption that *so* would ease the derivation of the agentive reading. Seeing as focused information is treated preferentially in processing, it could be that *so* underlines the stative nature of Sophia's characteristics, thereby promoting the state reading of the main clause. Unfortunately, the current design did not grant insight into the interpretational processes in the main clause. Alternatively, it could be that this new effect is not caused by coercion but some other processing difficulty related to *so* and e.g. the conjunction *um... zu*.

In sum, the present experiment offers support for the Coercion Account. The copula is stative and the agentive reinterpretation triggered by the agentive conjunction *um... zu* is a cognitively costly process. The predictions of

[1] See Chapter 10 for a discussion on the strength and reliability of the effects.

the Underspecification Account are unsupported. The results must be interpreted in the context of the criticism of Experiment 2, in particular with regards to the control conditions. Despite these shortcomings, the coercion effects appeared on the preview interest area, which was unaffected by the conjunction correction calculation.

9.2 Experiment 10: Property Permanence

This study investigated the perceived duration of characteristics expressed by stage-level and individual-level adjectives. It was originally intended as a pretest for creating sentence stimuli, akin to Experiment 1. It was later not followed up on due to methodological concerns and shift of focus. Unlike the previous studies, this experiment used the present tense for the stimuli, which could have primed the participants to a generic reading. Furthermore, the distribution of the adjectives to categories was subjective. Lastly, the duration of a characteristic is a poor indication of its belonging to the stage-level or individual-level class (see the discussion in Chapter 2).

Despite these shortcomings, the experiment offers interesting insight into the properties of adjectives.

9.2.1 Methods

Design and Predictions

The study had a 1 x 4 design with the within-factor duration of characteristic (permanent vs. long-lasting vs. long- or short-lasting vs. short-lasting). If my intuitions are correct, then the adjectives in the permanent adjective group will be judged as having the longest duration, followed by the long-lasting group, and finally the short-lasting group. The adjectives that are ambiguous between a short or long duration will be positioned somewhere between the two last groups.

Materials

32 items and 32 fillers were distributed via Latin square design over four pseudorandomized and counterbalanced lists. All sentences in the experiment were in the present tense. The division of adjectives into duration categories was based on native speaker consultants and my own intuition about how long the characteristics last. An example item is provided in (159). The items had the same structure: a named subject, a copula, and an adjective.

(159) a. Ronja ist getauft. ‘Ronja is baptized.’ *permanent*
b. Ronja ist loyal. ‘Ronja is loyal.’ *long*
c. Ronja ist kindisch. ‘Ronja is childish.’ *short or long*
d. Ronja ist munter. ‘Ronja is bright.’ *short*

(160) a. Laura studiert Medizin. ‘Laura studies medicine.’
b. Felix trägt eine Brille. ‘Felix wears glasses.’

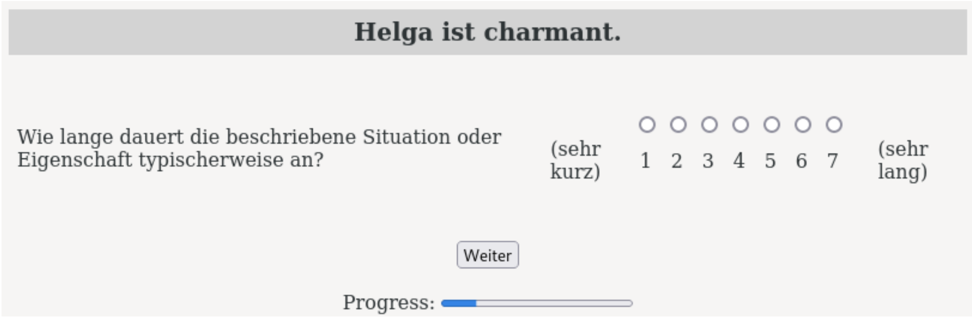


Figure 9.2: Stimuli presentation in Experiment 10.

Filler items were constructed in a way that mirrored the items but contained different verbs and no adjectives, as in (160). Half of the fillers were predicted to be short and half to be long situations/characteristics. In both the items and the fillers, half of the subjects were female and half were male. The length of the names and adjectives was normalized so that all names and characteristics in all conditions had a similar length.

Procedure

The experiment had the form of an online questionnaire and was programmed with OnExp ver. 1.2 (OnExp 2012). The stimulus presentation and rating scale similar to that in Experiments 1 and 3 (see Figure 9.2). The participants were seated in front of a PC in a computer pool. Before the start of the experiment, they were asked to answer general questions concerning their native languages, age, gender, handedness, and federal state of origin. Next, they read instructions detailing the experimental task and providing examples of an experimental trial. At the start of the experiment, the participants trained on four exercise sentences (two long and two short situations or characteristics).

The participants were instructed to read naturally and rate the sentences as quickly as possible. After reading a sentence, they were required to rate how long the situation described by it lasts (*Wie lange dauert die beschriebene Situation oder Eigenschaft typischerweise an?* ‘How long does the described situation or characteristic typically last?’). They used a seven-point Likert scale (Likert 1967) from 1 (*sehr kurz* ‘very short’) to 7 (*sehr lang* ‘very long’) to estimate the duration. The next trial was started by clicking on the *Weiter* ‘onwards’ button.

The experimenter stayed in the back of the room. The participants were encouraged to ask them technical and task-related questions. Every list started with a filler item. The experiment took 5 minutes on average (between 3 and 10 minutes). The study was conducted along a second, unrelated experiment with a similar task. At the end of both experiments, the participants read a short explanation of the purpose of each study.

Condition	Mean rating	SD	Min	Max
permanent	6.50	1.12	1	7
long-lasting	5.31	1.30	2	7
ambiguous short or long	5.07	1.77	1	7
short-lasting	2.31	1.05	1	6
filler long-lasting	4.84	1.48	1	7
filler short-lasting	2.18	0.91	1	6

Table 9.5: Results of Experiment 10. SD = standard deviation.

Participants

28 native speakers of German, aged 27 (SD=8) were recruited for the experiment. 22 were women, 23 were right-handed, and 27 were monolingual German native speakers. The participants came from the following federal states: Baden-Württemberg, Berlin, Lower Saxony, and North Rhine-Westphalia. They were randomly assigned to lists (7 participants per list) and had normal or corrected to normal vision. They were naïve to the purpose of the study and had not participated in any other experiment relating to agentivity. They received 5 EUR as compensation for taking part in this study and the concurrent one.

9.2.2 Analysis and Results

The analysis was calculated in R (R Core Team 2021). The results are summarized in Table 9.5 and the rating per item are illustrated in Figure 9.3. The ratings were normalized via a z-transformation for each participant prior to the analysis and compared using t-tests. All significant results are reported. The full list of items and their ratings is in Appendix H.

The permanent characteristics were judged to have a longer duration than the long-lasting ones ($t_1[27]=-6.63$, $p<0.001$, 95% CI: -0.79, -0.42; $t_2[31]=-8.11$, $p<0.001$, 95% CI: -0.75, -0.45). There was no difference between the long-lasting properties and ambiguous short-/long-lasting ones (*ts*<1.3). The short-lasting characteristics were rated as such compared to the other conditions ($t_1[27]=-12.21$, $p<0.001$, 95% CI: -1.58, -1.13; $t_2[31]= -12.75$, $p<0.001$, 95% CI: -1.57, -1.14). The difference between the filler types was also significant ($t_1[27]= 36.11$, $p<0.001$, 95% CI: 1.25, 1.40; $t_2[31]= 11.28$, $p<0.001$, 95% CI: 1.08, 1.58).

9.2.3 Discussion

Overall, the predictions for the differences between the adjective groups were met. Permanent properties were judged longest, followed by long-lasting and ambiguously long- or short-lasting ones, and finally the properties short in duration. However, there were large differences between the ratings within items, as evident in Figure 9.3. Although the trend may have been correct, the intuitions about particular adjectives were not.

There was little overlap in ratings between the present study and Experiments 1 and 7. The ratings in the present experiment were higher than in the

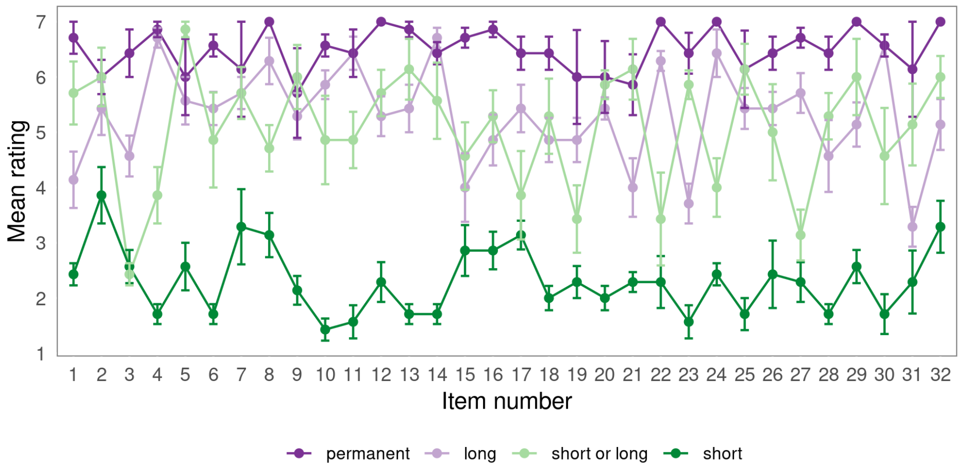


Figure 9.3: Item ratings in Experiment 10.

other studies. The mean rating in the present experiment was 4.80 (SD=1.72) compared to 3.51 (SD=1.37) in Experiment 1 and 2.94 (SD=0.93) in Experiment 7. The comparison between the experiments is limited by the fact that the tenses used in stimuli differed between Experiments 1/7 and Experiment 10. The difference could have influenced the preference for a generic reading or triggered lifetime effects (see also Chapter 2).

Across the three studies, no adjectives that were rated ≥5. There were also no adjectives which were rated that high for naturalness (≥5) but low (≤2) for duration. Among the adjectives that scored poorly on agentivity, there were a few which were simultaneously uncontrollable and short in duration: *bewusstlos* 'unconscious', *atemlos* 'breathless', and *errötet* 'flushed'. The group of adjectives which are both permanent and beyond voluntary control was somewhat larger: *blind* 'blind', *braunäugig* 'brown-eyed', *dunkelhäutig* 'dark-skinned', *einarmig* 'one-armed', *hochbegabt* 'highly gifted', *klein* 'small', *lang* 'long', *magersüchtig* 'anorexic', *tot* 'dead', *unfruchtbar* 'infertile', *verwaist* 'orphaned', and *verwitwet* 'widowed'. Unfortunately, 'friendly' was not part of the present study.

9.3 General Discussion

The experiments presented in this chapter are somewhat orthogonal to the quest for the source of Sophia's friendliness. Experiment 9 was a follow-up study to Experiment 2, but it suffered from the same shortcomings as its predecessor. Experiment 9 investigated whether bringing the focus to the copula-adjective combination by means of *so* has an influence on the processing of coercion. The study successfully replicated the coercion effect from Experiment 2 and also found a similar effect in regression path duration (cf. Table 9.4). Overall, the results of the study provide evidence in favor of the Coercion Account but must be quantified with respect to the criticism of Experiment 2. The predictions of the Underspecification Account were unsupported.

Experiment 10 explored the perceived duration of properties denoted by stage-level and individual-level adjectives. The four predicate groups (permanent, long-lasting, ambiguous long- and short-lasting, and short-lasting) were on average judged in accordance with the predictions. However, there were large variations in duration within particular items. The difference in tenses and sample size used in Experiment 10 compared to Experiments 1 and 7 limits the comparability between the studies.

The experimental part of the friendliness journey ends here. The final chapter recapitulates the theoretical considerations on all the elements of agentivity. It offers an overview of the empirical exploration of Sophia's active and passive friendliness. It also draws the conclusions from the results of the studies presented in the previous chapters.

10 Conclusion

This is the end. It all started with the stative-agentive alterations in (1)–(2) and the promise of revealing whether Sophia is friendly or only acting the part. The properties in (1a) are typically accepted as parts of Sophia's personality. By contrast, the characteristics in (1b) carry implications of Sophia's deliberate behavior. This change in meaning is the agentivity effect.

(1) a. Sophia is friendly/noisy/intelligent/retired.
 b. Sophia is being friendly/noisy/*intelligent/*retired.
 c. The children are quiet/asleep.
 d. The children are being quiet/*asleep.

(2) a. The river is noisy/*dirty/*friendly.
 b. The river is being *noisy/*dirty/*friendly.
 c. ?The river is being noisy after last night's torrential downpour.
 d. ?The river is being friendly again after the evil spirit was exorcised.

Agentivity arises from the interplay between the subject, the verb, and the predicate, but it is unclear what the mechanisms behind it are. The examples in (1c)/(1d) and (2) illustrate a number of restrictions on the agentivity effect. Chapters 2–4 discussed the elements of a minimal agentive copular construction, such as those in (1).

Chapter 2 outlined the effects associated with stage-level and individual-level predicates and found that the criteria for differentiating between the two are nebulous. The second part of the chapter summarized a number of theories that attempt to establish core criteria for the stage-level vs. individual-level opposition. According to these theories, the essence of the stage-level and individual-level contrast lies in their ontology (Carlson 1977; Dowty 1979), lexico-syntactic differences (Chierchia 1995; Diesing 1992; Fernald 2000; Husband 2012; Kratzer 1995), or a variety of (pragmatic) effects (de Hoop and de Swart 1990; Jäger 1999; Maienborn 2004). The chapter concluded that the distinction between stage-level and individual-level predicates cannot be solely responsible for the agentivity effect.

Chapter 3 was dedicated to the copula. It summarized a variety of approaches to the diverse uses of the copula, in particular with regards to the state and activity interpretations of Sophia's friendliness. The proposal of a singular but multi-functional copula that can account for both passive and active friendliness proved to be most attractive. Two singular *be* theories were most instructive in approaching the agentivity effect: the Underspecification Account and the Coercion Account. These two accounts derive their names from the mechanisms that drive the availability of an agentive interpretation.

The Underspecification Account proposes that the copula is underspecified (Rothstein 1999, 2004). The state and event interpretations (and their limitations) of Sophia's friendliness or intelligence depend on the adjectival predicate, world knowledge, and the utterance context. The copula itself can be persuaded to either a state or an event interpretation, as long as the adjective permits it. Initially, the representation is underspecified. Later, the eventuality gap is filled with appropriate features based on the upcoming sentence material, the context or world knowledge.

In contrast, the Coercion Account argues in favor of a stative copula (Maienborn 2003a,b, 2019). Sophia's properties in (1a) express states and the full interpretation is computed compositionally. The agentive implications in (1b) are the result of coercing the state of friendliness to a friendliness activity. This reinterpretation is a pragmatic process, which may not always be possible.

The first part of the subsequent chapter (Chapter 4) briefly focused on the subjects of agentive phrases, concluding that sticking with Sophia is our best bet. Next, it discussed the advantages of (neo-)Davidsonian event semantics and the properties of eventualities. It determined that *Sophia is being friendly* is typically categorized as an activity, whereas *Sophia is friendly* is a state, although it permits other interpretations. With that, all components of a minimal copular agentive construction were in place.

The second part of Chapter 4 traversed the paths to the activity and state interpretations of Sophia's friendliness laid out by the Underspecification Account and the Coercion Account. In particular, it summarized the key concepts behind complement and aspectual coercion (Asher 2011; Fernald 1999; Maienborn 2003b; Moens and Steedman 1988; Pustejovsky 1991; Steedman 2011; de Swart 2011), as well as underspecification (Bierwisch 1997; Blutner 2000; Dölling 2014; Egg 2011; Frazier and Rayner 1990; Pulman 1997; Pustejovsky 2017). Special focus was given to aspectual coercion, which was characterized as a repair mechanism responsible for shifting a state into an activity or a dynamic state. The underspecification approaches explained Sophia's passive and active friendliness as the product of the disambiguation of an incomplete meaning representation.

Chapter 5, in turn, provided an empirical background to underspecification and coercion. This chapter surveyed a large number of psycholinguistic and neurolinguistic studies. It also examined the key measures and common effects associated with underspecification and coercion. Underspecification is generally assumed to not leave traces in processing beyond composition. Coercion effects appeared in an assortment of experimental paradigms, from offline studies, to eye-tracking, to brain imaging ones. However, different types of reinterpretation led to varying processing delays, as not all coercions appear to evoke the same effects. Furthermore, the context seems to play a role in processing coercion. The experiments summarized in this chapter prepared the expectations of the time and location for agentivity effects arising from coercion and underspecification.

The remaining chapters (Chapters 6–9) contrasted the Underspecification and Coercion Accounts in 10 psycholinguistic experiments. The key predictions and findings in the experiments presented in this thesis are summarized in Table 10.1. Although the studies focused on the German copula, the results can be generalized to agentivity effects obseved in English.

Experiment 1 was an acceptability rating study whose main purpose was to establish agentivity across a large sample of adjectives based on their acceptability with the verbs 'to act'. Two German verbs, *sich verhalten* and *sich benehmen*, were used to probe the adjectives' compatibility with an eventive interpretation. The study found a continuum of agentivity and guided the selection of building blocks for the sentence stimuli in the studies that followed.

Experiment 2 was the first eye-tracking during reading study. Copular main clauses with agentivity-compatible adjectives were combined with either an agentive conjunction *um... zu* 'in order to' or a neutral one *weil* 'because'. The copular sentences were evaluated against ones with the verb *sich verhalten* 'to act'. The experiment aimed at establishing the mechanisms behind agentivity by contrasting two theoretical accounts: the Coercion Account and the Underspecification Account. The study found a weak coercion effect in regression proportions from the preview interest area before the conjunction, providing evidence to support the Coercion Account.

Experiment 3 tested the acceptability of the stimuli used in the previous study. The main goal was to establish whether the control sentences used in Experiment 2 were adequate. A secondary aim was to investigate whether agentive coercion effects are reflected in offline acceptability judgments. The study found that the control sentences were flawed but there was no indication of reinterpretation efforts. As a result, new control conditions were created for a replication study.

Experiment 4 was the second eye-tracking during reading study with improved sentence material. This experiment successfully replicated the coercion effect found in Experiment 2. The results provide further evidence in favor of the Coercion Account and the stative nature of the copula.

Experiment 5 was the third eye-tracking during reading study. Unlike the previous ones, it contrasted agentive subordinate clauses headed by *um... zu* 'in order to' with neutral ones headed by *da* 'because' instead of its synonym *weil*. The goal of this experiment was to determine whether the coercion effect observed in Experiments 2 and 4 can be replicated with a different neutral conjunction. The study was unsuccessful in its attempt because sentences with *da* lead to unexpected processing difficulties. This was likely due to the fact that *da* appears most frequently in anteposition, which was not the case in the experiment's target sentences. The conjunction's uncharacteristic position attracted the reader's visual attention.

Experiment 6 was a self-paced reading study which had a dual purpose. On the one hand, it attempted to once more replicate the coercion effect observed in Experiments 2 and 4 in a new paradigm. On the other hand, it compared the structural differences between the conjunctions *um... zu* and *weil* in order to establish whether the syntactic disparity between the two accounts for the reading patterns previously interpreted in favor of the Coercion Account. The study revealed that neither coercion nor syntax influenced the reading times. The results indicate that the coercion effects observed in the eye-tracking studies are unrelated to structural differences between the two conjunctions. The absence of a coercion effect could be due to the lack of sensitivity on the side of the self-paced reading paradigm.

Experiment 7 reevaluated the agentivity of the adjectival predicates. Unlike Experiment 1, Experiment 7 used three adverbs of control *absichtlich* 'intentionally', *bewusst* 'deliberately', and *freiwillig* 'voluntarily' to manipulate the adjectives' agentivity. The study revealed, once again, a continuum of agentivity. However the acceptability ratings differed from the ones in Experiment 1. This result suggests that agentivity is more complex and context-dependent than generally assumed.

Experiment 8 was the second self-paced reading study. In contrast to the previous experiments, it investigated copular predicates coupled only with agentive subordinate clauses. Furthermore, the main clauses contained either a stage-level or an individual-level adjective. This not only permitted me to record reading latencies for the entire sentence (unlike in the previous studies), but also created a mismatch condition, which verified the paradigm's sensitivity. In addition to reading times, the study recorded sensicality judgments, which probed the completed interpretations. The analysis detected no reading time effects in the mismatch condition, casting doubt on the sensitivity of the paradigm. Some indication of a conflict between the individual-level predicate and the agentive subordinate clause was visible, but no coercion effects were present in reading times. Sensicality judgments revealed that coercing conditions had reduced acceptance compared to compositional controls. These findings are somewhat in line with the predictions of the Coercion Account.

Experiment 9 was a manipulation of Experiment 2. The copular main clauses were manipulated by the addition of the focus or intensifier particle *so*. The study found evidence of coercion in support of the Coercion Account by replicating the effect from Experiments 2 and 4. However, due to flaws in the design, the results cannot be interpreted without some degree of quantification.

Finally, Experiment 10 investigated the duration of the properties denoted by stage-level and individual-level adjectives in a forced-choice rating study. The results suggest that the intuitions about the duration of the adjectives were correct on average, but diverged in particular cases.

Predictions	Results and Conclusion
Experiment 1 (acceptability judgments)	
some adjectives will be compatible with *sich verhalten* and/or *sich benehmen* ‘to act’, others will not	a continuum of adjective acceptability, *sich verhalten* $>$ *sich benehmen* → items & controls for next experiments
Experiment 2 (eye-tracking during reading)	
CA: *war+um... zu* $>_{rt,reg}$ *war+weil* UA: *war+um... zu* $=_{rt,reg}$ *war+weil*	several unpredicted effects, war+*um... zu* $>_{reg}$ *war+weil* (marginal) → some support for CA
Experiment 3 (acceptability judgments)	
control+*um... zu* = control+*weil* CA: *war+um... zu* $<$ *war+weil* UA: *war+um... zu* = *war+weil*	control+*um... zu* $>$ control+*weil* war+*um... zu* = *war+weil* → inadequate control conditions → no support for CA
Experiment 4 (eye-tracking during reading)	
CA: *war+um... zu* $>_{rt,reg}$ *war+weil* UA: *war+um... zu* $=_{rt,reg}$ *war+weil*	several unpredicted effects, *war+um... zu* $>_{reg}$ *war+weil* (marginal) → replicated effect in Experiment 2 → some support for CA
Experiment 5 (eye-tracking during reading)	
CA: *war+um... zu* $>_{rt,reg}$ *war+da* UA: *war+um... zu* $=_{rt,reg}$ *war+da*	*war+um... zu* $<_{rt,reg}$ *war+da* → inadequate conjunction comparison
Experiment 6 (self-paced reading)	
CA: *war+um... zu* $>_{rt}$ *war+weil* UA: *war+um... zu* $=_{rt}$ *war+weil* No syntactic influence on coercion: *um... zu+war* $=_{rt}$ *weil+war*	*war+um... zu* $=_{rt}$ *war+weil* *um... zu+war* $=_{rt}$ *weil+war* → no coercion or too subtle for self-paced reading → previous effects are not due to syntactic differences
Experiment 7 (acceptability judgments)	
some adjectives will be compatible with *absichtlich*, *bewusst*, and/or *freiwillig* judgments may overlap with Experiment 1	a continuum of adjective acceptability *bewusst* $>$ *absichtlich* $>$ *freiwillig*, little overlap with Experiment 1 → different tests measure various facets of agentivity → items for Experiment 8
Experiment 8 (self-paced reading with sensicality judgments)	
CA: *war*+SLP $>_{rt}$ *verhalten*+SLP *war*+SLP $<_{sen}$ *verhalten*+SLP UA: *war*+SLP $=_{rt,sen}$ *verhalten*+SLP Copular conditions: ILP+*um...zu* $>_{rt}$ SLP+*um...zu* ILP+*um...zu* $<_{sen}$ SLP+*um...zu*	*verhalten* $>_{rt}$ *war* *verhalten*+SLP $>_{rt}$ *verhalten*+ILP *war*+ILP $<_{rt}$ *war*+SLP *war*+SLP $<_{sen}$ *verhalten*+SLP → no mismatch, no coercion effects in RT → coercion effects in sensicality judgments → measures are too coarse or coercion is too elusive → some support for CA
Experiment 9 (eye-tracking during reading)	
CA: *war so+um... zu* $>_{rt,reg}$ *war so+weil* UA: *war so+um... zu* $=_{rt,reg}$ *war so+weil*	*war so+um... zu* $>_{rt,reg}$ *war so+weil* → possibly unrelated to coercion → old controls → some support for CA

Continued on next page

Table 10.1 – *Continued from previous page*

Predictions	Results and Conclusion
Experiment 10 (acceptability judgments)	
permanent, long-lasting, and short-lasting adjectives will be judged in accordance with their group; ambiguous long-/short-lasting adjectives will be positioned between the latter two groups	predictions were substantiated on average, but individual adjectives did not always conform to their group

Table 10.1: Summary of all experiments. CA = Coercion Account; UA = Underspecification Account; >, <, = indicate ease of processing; reg = regression; rt = reading times; sen = sensicality.

The Experiments 1, 7, and 10 compared different aspects of the semantics of adjectives. The former two studies explored various ways of eliciting agentive interpretations and showed that the results depended on the test. This finding suggests that agentivity is context-dependent. There are pragmatic elements at play which include the sentence and extend beyond it. Experiment 10 targeted the duration of an eventuality expressed by adjectival predicates. Although the three studies are not easily compared, they demonstrate that each of the investigated aspects is on a continuum. A clear-cut division into stage-level and individual-level predicates is not possible.

The self-paced reading Experiments 6 and 8 revealed no agentive reinterpretation effects, although other kinds of aspectual coercion have been known to appear in this paradigm (e.g. Brennan and Pylkkänen 2010; Lukassek et al. 2017; Todorova et al. 2000a). There are two possible explanations for their absence. The shift from a state to an activity may not be as taxing on the processor as assumed. In this case, the self-paced reading paradigm may too coarse for certain semantic mismatches. Alternatively, there could simply be null effects, pointing to underspecification. The reservations with regards to interpreting the lack of findings in favor of the Underspecification Account are substantiated by the fact that the mismatch condition in Experiment 8 did not trigger longer reading times compared to a compositional control. However, both the mismatch and the coercion were reflected in the sensicality judgments. In conclusion, the incongruities were picked up by the participants, but accommodated too swiftly to appear in reading times.

The results of both studies are comparable, despite two major differences. The former experiment was administered in a lab setting, whereas the latter was conducted remotely online. The tasks varied between the two studies as well. In Experiment 6, the participants read the sentences and were asked to answer comprehension questions, which probed whether they paid attention. In Experiment 8, the participants were instead required to judge the sensicality of the sentence. This led to divergent reading strategies between the two studies. The participants concentrated equally on the entire sentence in all conditions in the former experiment. They stopped reading the mismatch condition in the latter one once they did not need the remaining content to determine whether the sentence was baloney. This result strongly suggests that reading strategies are affected by the experimental task (cf. Pickering, McElree, Frisson, et al. 2006).

With respect to Experiments 2, 4, and 9, Table 10.2 compares the reliability and strength of the findings across the eye-tracking studies. Reliability is measured by how frequently an effect appeared in the studies under the assumption that a reliable effect is visible more frequently. Four effects emerged in all three studies. The main effect of conjunction type was visible in the first pass duration on the spillover interest area. It also manifested on the conjunction and spillover interest areas in regression path durations. Crucially, the coercion effect in the first pass regressions was also visible in all three experiments. Finding the same reading pattern for reinterpretation across the studies is reassuring in that coercion, if subtle, is undeniably taking place.

The second important quantifying factor of the effects is the power. The eye-tracking analyses evaluated five measures for each critical interest area: first and second pass reading times, first fixation duration, regression path duration, and first pass regression proportions. A multitude of analyses on the same data can lead to erroneously interpreting spurious effects as authentic ones. Therefore, it is important to correct for repeated measurement (Vasishth et al. 2018; von der Malsburg and Angele 2017).

In lieu of a Bonferroni correction, the "Strength" column in Table 10.2 adopts a significance level of 0.01 instead of the customary 0.05. Under a more stringent condition, few effects in the eye-tracking studies achieved the desired level of significance. Most of them reflect the difference between the conjunctions and none of them are related to coercion effects. This result appears to be in line with the Underspecification Account (Rothstein 1999, 2004).

Nevertheless, the marginal coercion effect was reliably present in all three studies ($p_2 \leq 0.05$, $p_4 \leq 0.08$, $p_9 \leq 0.02$), which is unlikely to be by chance. While I interpret it as coercion, in line with the predictions of the Coercion Account (Maienborn 2003a,b), others might argue that it is triggered by word frequency or specification (e.g. Dölling 2014). One way of verifying the nature of this effect would be either recording more participants or replicating Experiment 8 as an eye-tracking study. However, with the current risk of infection, I would prefer not to wait for Covid19 to be eliminated before graduating, so I leave this with heavy heart for further research.

Lastly, most studies were accompanied by a reading span task. The addition of the participants' reading spans to the analyses did not reveal any meaningful effects. This could be due to the administered version of the test (Rummel et al. 2017). The test was automated, and had a number of spelling and programming errors. Alternatively, it could be that the coercion effects were too faint to engage the working memory in any meaningful fashion. This explanation is plausible, seeing as agentive reinterpretation was too subtle for self-paced reading.

In sum, the experiments suggest that the copula is stative. The agentive reading is the product of coercion, as hypothesized by the Coercion Account

IA	Effect	Exp 2	Exp 4	Exp 9	Reliability	Strength
First pass duration						
5	*war* > *verhielt sich*	∗	—	—	★☆☆	∗ — —
5	*verhielt sich+weil* > *verhielt sich+um… zu*	∗	—	∗	★★☆	— — —
6	*weil* > *um… zu*	∗	∗	∗	★★★	— ∗ —
First fixation duration						
5	*weil* > *um… zu*	—	—	∗	★☆☆	— — —
5	be > act	∗	—	—	★☆☆	∗ — —
5	*verhielt sich+weil* > *verhielt sich+um… zu*	∗	—	∗	★★☆	— — —
6	*weil* > *um… zu*	—	∗	—	★☆☆	— — —
6	*verhielt sich+weil* > *verhielt sich+um… zu*	—	—	∗	★☆☆	— — —
Regression path duration						
4	*war+um… zu* > *war+weil*	—	—	∗	★☆☆	— — —
5	*war* > *verhielt sich*	∗	—	—	★☆☆	— — —
5	*weil* > *um… zu*	∗	∗	∗	★★★	∗ ∗ —
6	*war* > *verhielt sich*	∗	—	—	★☆☆	— — —
6	*weil* > *um… zu*	∗	∗	∗	★★★	∗ ∗ ∗
Second pass duration						
5	*war* > *verhielt sich*	—	∗	—	★☆☆	— — —
First pass regression ratios						
4	*war+um… zu* > *war+weil*	∗	∗	∗	★★★	— — —
5	*weil* > *um… zu*	∗	—	—	★☆☆	— — —
6	*weil* > *um… zu*	∗	—	∗	★★☆	— — —
6	*war* > *verhielt sich*	—	∗	—	★☆☆	— — —

Table 10.2: Comparison of the effects found in the eye-tracking experiments. — = no effect; ∗ = effect; > = longer reading times or more frequent regressions; Exp = experiment; IA = interest area; stars indicate the reliability of the effect.

(Maienborn 2003a,b). Agentive reinterpretation is relatively easy compared to other types of aspectual coercion (Bott 2010, 2013). This finding is unexpected, because agentive coercion requires not only the shift between eventualities from a state to an activity, but also the interpolation of an agent. Therefore, it was expected to elicit processing difficulty akin to additive coercion (Bott 2008) and display effects in reading similar to those found e.g. by Bott (2010), Carpenter and Just (1977), and Frisson, Pickering, et al. (2011).

What can we say about Sophia? She is certainly friendly, to which I can attest. Whether by coincidence or by design, her friendliness comes about offhandedly. The results of her efforts are perceived in sensicality and some glimpses may appear in reading patterns.

A
Brief Introduction to Discourse Representation Theory

Discourse Representation Theory (DRT) is a semantic framework (Kamp and Reyle 1993) which is simultaneously orthogonal to and a continuation of Montague semantics (Montague 1974). It has been widely used to describe a multitude of phenomena. One crucial aspect of DRT is the way it formalizes semantic representations. According to DRT, the interpreter constructs a mental representation of the discourse as it unfolds. Each incoming sentence (fragment) prompts an update of this representation. This mental representation is called a “discourse representation structure” (DRS) (Geurts et al. 2020).

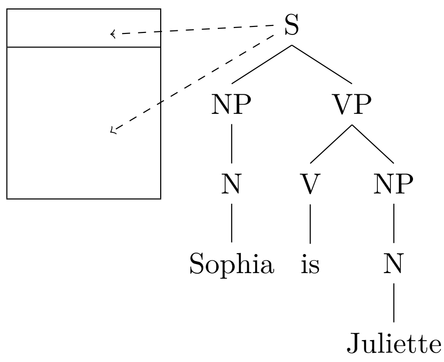
An introduction to Discourse Representation Theory is beyond the scope of this work. However, the reader may be unfamiliar with discourse representation structures. This appendix is intended to make it easier to understand the mechanics behind a DRS and enable the reader to better understand the discourse representation structures presented in this thesis. See Kamp and Reyle (1993) for an in-depth account of the standard rules governing the translation of sentences to discourse representation structures. In writing this brief synopsis, I am also relying on Bott (2010) and Geurts et al. (2020). For clarity, the syntactic representations have been greatly simplified.

Figure A.1 provides a simple example of how a DRS is built up. This DRS corresponds to the *be* of identity illustrated in Figure 3.4 from Chapter 3: *Sophia is Juliette.* Initially, the DRS is empty. It consists of two parts. The top part is a set (or universe) of *discourse referents*, i.e. the objects or individuals under discussion. The bottom part is a set of DRS-conditions, which record the information about the discourse referents. Next, the utterance time and state information are interpreted. The discourse referents and their conditions are added to their respective DRS parts. Then, both discourse references are integrated. Finally, the equality relation between Sophia and Juliette is introduced. Both referents are part of the same DRS, therefore they can be accessed without mediation. The DRS is complete.

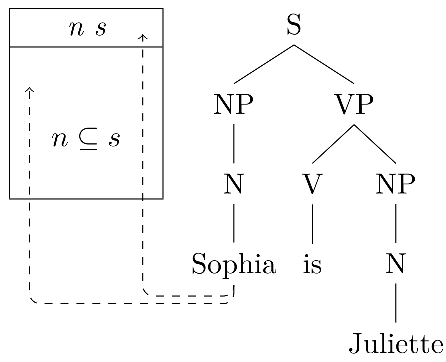
A more complex example of how a DRS unfolds is depicted in Figure A.2 for *Sophia is being friendly.* This DRS corresponds to Figure 4.4b from de Swart (1998) in Chapter 4. The first two steps are identical to those in Figure A.1: the utterance time, its relation to the situation, and Sophia are added to the representation. Next, information about the sentence's grammatical aspect is incorporated. At the same time, the relationship between the state s and the time t denoted by the sentence is specified. In prose: the friendliness is happening as the sentence is uttered. After this step, the main DRS contains a subordinate DRS, which is the description of the state s.

Subsequently, the progressive aspect is integrated, which under normal circumstances would trigger the expectations of an event. Instead, it is met with a state. In order for the sentence to make sense, the state description must be reinterpreted into an event (or in de Swart's terms, a dynamic eventuality d). According to de Swart (1998), this is accomplished by means of a coercion operator C_{sd}, which performs the required shift. Lastly, the adjective is added and its reference to the subject is established.

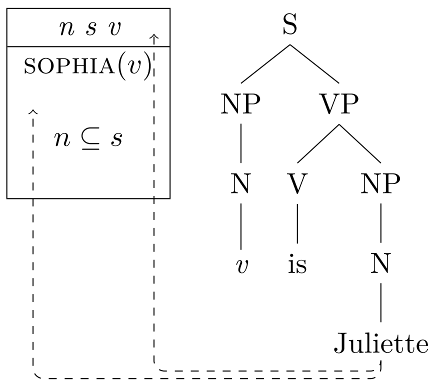
Note that construction of the DRS for *Sophia is friendly* (Figure 4.4a from Chapter 4) proceeds much in the same way as the DRS in Figure A.2. Only the steps (A.2d) and (A.2e) are omitted as there is no progressive, and therefore no need for coercion.



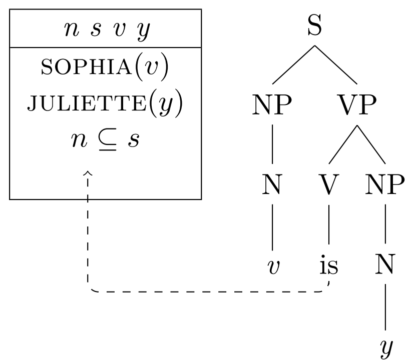
(a) The tense information is translated: the utterance time (present) and its relation to the state expressed by the sentence.



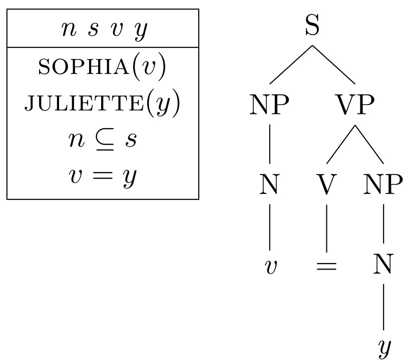
(b) Sophia, the first discourse referent, and a variable v relating to her are added to the representation.



(c) Juliette, the second discourse referent is integrated, along with a corresponding variable y.

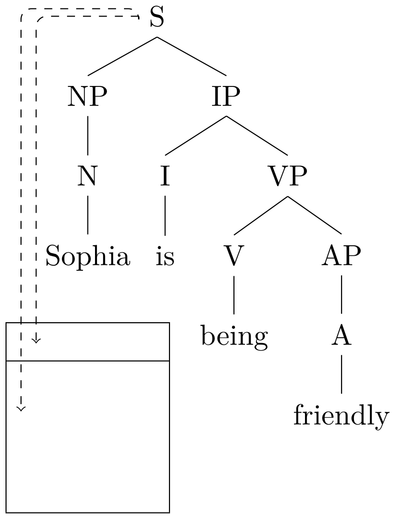


(d) Lastly, the identity relation between Sophia and Juliette is processed.

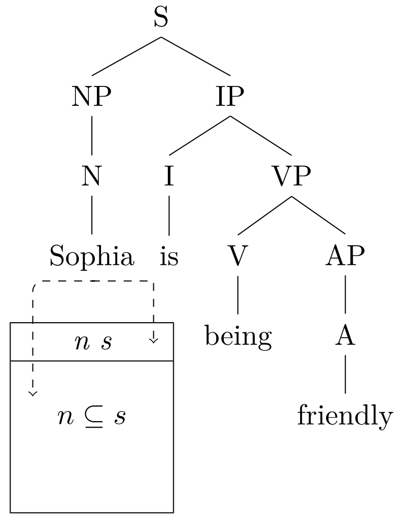


(e) The final discourse representation structure.

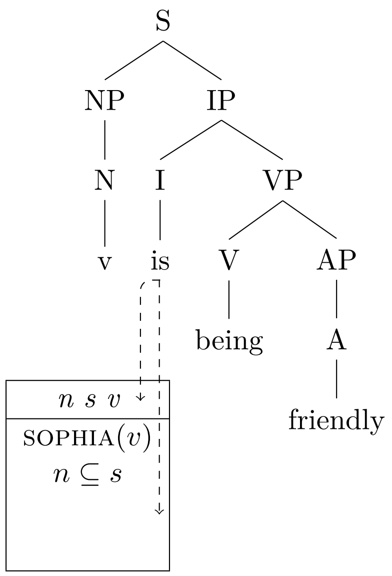
Figure A.1: The derivation of the discourse representation structure in Figure 3.4 from Chapter 3.



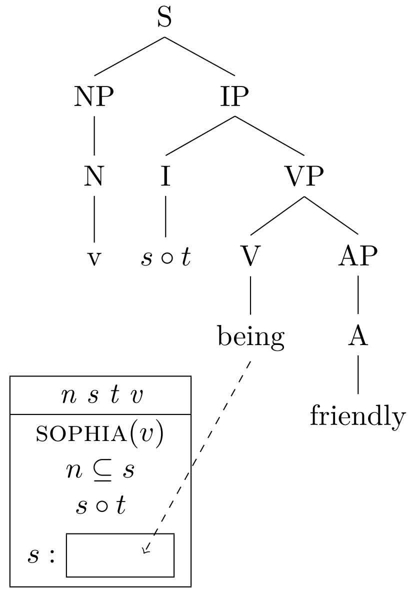
(a) The tense information is translated.



(b) The subject is integrated.

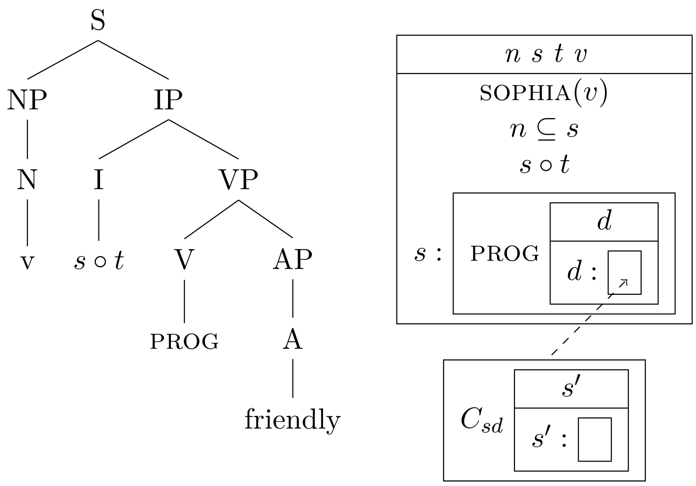


(c) The location time variable t and its (overlapping) relation to the friendliness state are added.

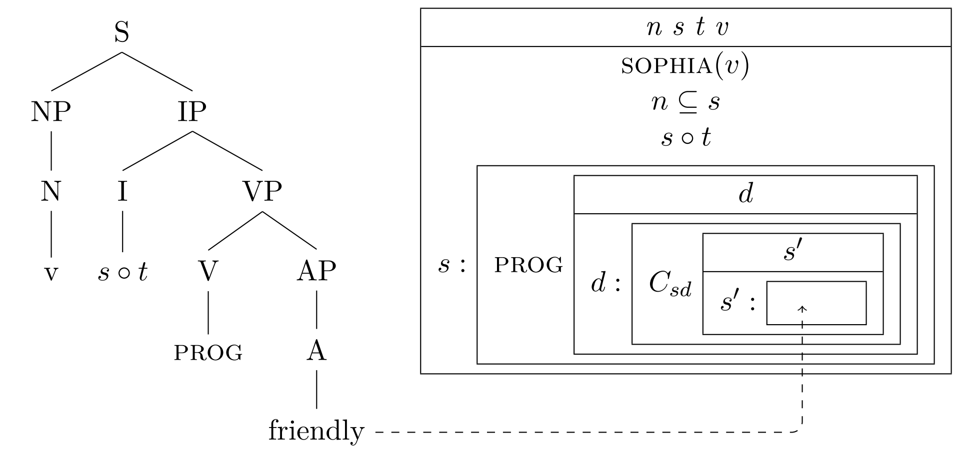


(d) The progressive aspect is processed. There is a clash between the state s and the dynamic situation introduced by the progressive.

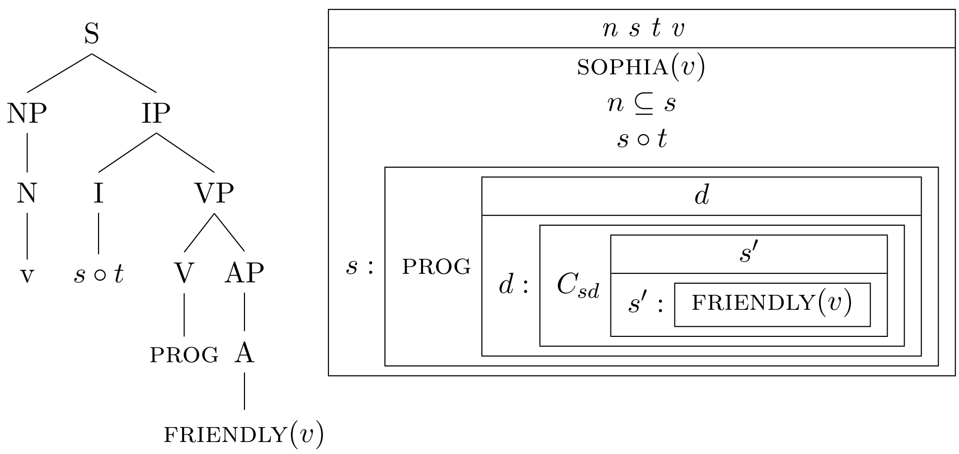
Figure A.2: The derivation of the discourse representation structure in Figure 4.4b in Chapter 4.



(e) The hidden coercion operator C_{sd} must be automatically inserted to allow for reinterpretation, so that the adjective can be integrated.



(f) The adjective is integrated.



(g) The final discourse representation structure.

Figure A.2: The derivation of the discourse representation structure in Figure 4.4b in Chapter 4 (continued).

B

Adjectives Used in Experiment 1

Table B.1: Adjectives used in Experiment 1. Standard deviation in brackets.

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
abweisend 'repellent'	2–7	5.9 (1.6)	6.2 (0.9)	5.6 (2.0)
achtsam 'mindful'	1–7	4.7 (2.0)	4.6 (2.3)	4.7 (1.7)
aggressiv 'aggressive'	1–7	5.6 (1.7)	6.2 (1.4)	5.0 (1.9)
aktiv 'active'	1–7	3.5 (1.8)	3.6 (1.9)	3.4 (1.8)
alt 'old'	1–7	2.4 (1.9)	2.1 (1.9)	2.6 (2.0)
altmodisch 'old-fashioned'	1–7	4.5 (2.2)	4.7 (1.6)	4.2 (2.7)
ambitioniert 'ambitious'	2–7	4.4 (1.5)	4.4 (1.7)	4.4 (1.4)
androgyn 'androgynous'	1–7	3.8 (1.9)	4.6 (2.0)	3.0 (1.5)
anerkannt 'recognized'	1–7	2.0 (1.5)	2.5 (1.9)	1.4 (0.7)
anhänglich 'clingy'	1–7	4.2 (2.2)	4.5 (2.3)	3.8 (2.2)
anlehnungsbedürftig 'in need of affection'	1–7	2.8 (1.9)	2.9 (1.9)	2.7 (2.0)
anspruchslos 'undemanding'	1–7	3.7 (2.3)	4.7 (2.1)	2.6 (2.1)
arbeitslos 'unemployed'	1–3	1.4 (0.7)	1.4 (0.7)	1.4 (0.7)
arbeitsunfähig 'unable to work'	1–4	1.6 (0.9)	1.7 (1.1)	1.4 (0.7)
ärgerlich 'annoying'	1–7	2.9 (2.0)	3.1 (2.6)	2.6 (1.4)
arm 'poor'	1–7	2.0 (1.5)	1.8 (0.9)	2.1 (1.9)
artig 'well-behaved'	1–7	5.4 (1.6)	5.0 (1.9)	5.7 (1.1)
atemlos 'breathless'	1–3	1.5 (0.8)	1.8 (0.9)	1.2 (0.4)
atheistisch 'atheistic'	1–7	2.4 (1.6)	2.6 (1.9)	2.2 (1.2)
athletisch 'athletic'	1–7	2.6 (1.8)	2.8 (1.7)	2.4 (2.0)
attraktiv 'attractive'	1–7	2.6 (1.9)	2.0 (1.9)	3.1 (1.7)

Continued on next page

Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
aufgekratzt 'exhilarated'	1–7	4.1 (2.2)	4.1 (1.8)	4.0 (2.6)
aufgeregt 'excited'	1–7	4.0 (2.2)	4.6 (2.3)	3.3 (2.0)
aufgetakelt 'tarted up'	1–7	2.0 (1.5)	1.8 (0.9)	2.2 (1.9)
aufmerksam 'attentive'	1–7	4.5 (2.3)	5.5 (1.9)	3.4 (2.3)
ausgehungert 'starved'	1–6	2.4 (1.5)	2.8 (1.9)	2.0 (1.1)
ausgeschlafen 'alert'	1–7	2.8 (1.8)	3.8 (1.9)	1.7 (1.0)
außergewöhnlich 'extraordinary'	3–7	6.1 (1.3)	6.8 (0.6)	5.4 (1.4)
autistisch 'autistic'	1–7	3.2 (2.4)	4.0 (2.4)	2.3 (2.1)
barbarisch 'barbaric'	1–7	5.4 (1.8)	6.1 (1.1)	4.7 (2.2)
begabt 'gifted'	1–7	2.0 (1.5)	2.0 (1.2)	1.9 (1.9)
begeistert 'enthusiastic'	1–6	2.9 (1.5)	2.4 (0.8)	3.3 (1.8)
beherrscht 'controlled'	1–7	3.3 (2.0)	4.0 (2.3)	2.6 (1.6)
behindert 'disabled'	1–7	2.1 (1.6)	1.7 (1.3)	2.5 (1.8)
bekannt 'known'	1–7	1.9 (1.5)	1.9 (1.9)	1.9 (1.0)
beliebt 'popular'	1–4	1.6 (0.9)	1.8 (1.0)	1.3 (0.7)
benebelt 'dazed'	1–6	3.2 (1.3)	3.3 (1.3)	3.0 (1.4)
bereit 'ready'	1–7	2.1 (1.5)	2.3 (2.0)	1.9 (0.9)
berufstätig 'employed'	1–7	2.2 (1.7)	2.1 (1.1)	2.2 (2.2)
berühmt 'famous'	1–7	1.8 (1.5)	1.8 (1.9)	1.7 (1.0)
bescheiden 'modest'	2–7	5.1 (1.8)	5.1 (2.0)	5.0 (1.8)
besoffen 'drunk'	1–7	2.9 (2.0)	2.5 (2.0)	3.3 (2.1)
besorgt 'concerned'	1–7	4.3 (2.0)	4.6 (2.3)	3.9 (1.6)
betäubt 'stunned'	1–4	1.8 (1.0)	1.9 (1.1)	1.7 (1.0)
betrunken 'drunk'	1–7	3.4 (1.9)	3.4 (2.0)	3.4 (1.8)
bewusstlos 'unconscious'	1–7	1.8 (1.5)	1.8 (0.9)	1.7 (1.9)
bissig 'snappy'	1–7	3.7 (2.3)	3.5 (2.6)	3.9 (2.0)
bitter 'bitter'	1–5	2.3 (1.5)	3.0 (1.8)	1.6 (0.8)
bleich 'pale'	1–2	1.2 (0.4)	1.2 (0.4)	1.2 (0.4)
blind 'blind'	1–7	2.0 (1.6)	2.4 (1.8)	1.5 (1.3)
blond 'blond'	1–7	2.9 (2.2)	2.7 (2.5)	3.1 (2.2)
böse 'angry'	1–7	3.9 (2.0)	3.6 (2.5)	4.1 (1.5)
braunäugig 'brown-eyed'	1–3	1.2 (0.5)	1.0 (0.0)	1.3 (0.7)
braungebrannt 'tanned'	1–4	1.6 (0.9)	2.0 (1.1)	1.1 (0.3)
brav 'well-behaved'	1–7	4.8 (2.0)	5.1 (2.2)	4.5 (1.8)
chaotisch 'chaotic'	1–7	4.2 (1.8)	4.2 (2.3)	4.1 (1.5)
charmant 'charming'	1–7	5.6 (1.9)	5.7 (1.4)	5.5 (2.4)
cholerisch 'choleric'	1–7	4.5 (2.1)	3.7 (2.0)	5.3 (2.0)
cool 'cool'	1–7	5.3 (1.9)	5.3 (1.9)	5.3 (2.0)
defensiv 'defensive'	3–7	6.1 (1.2)	6.5 (0.7)	5.6 (1.4)
dehydriert 'dehydrated'	1–7	2.2 (1.6)	2.5 (2.1)	1.9 (0.9)
deutsch 'German'	1–7	3.2 (1.8)	3.0 (1.4)	3.3 (2.1)
dick 'thick'	1–3	1.4 (0.6)	1.7 (0.7)	1.1 (0.3)
dienstunfähig 'unfit for work'	1–6	2.1 (1.5)	2.6 (1.8)	1.6 (0.8)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
diplomatisch ‘diplomatic’	1–7	5.8 (1.7)	6.1 (1.9)	5.5 (1.5)
diplomiert ‘qualified’	1–4	1.5 (0.9)	1.8 (1.1)	1.2 (0.4)
diszipliniert ‘disciplined’	1–7	5.4 (1.6)	4.9 (2.0)	5.9 (1.1)
drogenabhängig ‘addicted to drugs’	1–7	2.3 (1.8)	2.8 (2.2)	1.8 (1.0)
drogensüchtig ‘addicted to drugs’	1–4	1.9 (0.9)	2.0 (1.3)	1.8 (0.4)
dumm ‘stupid’	1–7	4.5 (2.4)	4.8 (2.1)	4.1 (2.6)
dümmlich ‘simple-minded’	1–7	4.3 (2.3)	4.2 (2.5)	4.3 (2.2)
dunkelhäutig ‘dark-skinned’	1–4	1.2 (0.7)	1.3 (1.0)	1.1 (0.3)
dünn ‘thin’	1–3	1.3 (0.7)	1.4 (0.7)	1.2 (0.6)
durstig ‘thirsty’	1–7	2.8 (2.1)	3.5 (2.6)	2.0 (0.8)
ehrlich ‘honest’	1–7	3.8 (1.9)	4.0 (2.2)	3.5 (1.6)
eifersüchtig ‘jealous’	1–7	5.3 (2.1)	5.9 (1.6)	4.6 (2.3)
eigenwillig ‘headstrong’	1–7	5.5 (1.7)	6.0 (0.9)	5.0 (2.1)
einarmig ‘one-armed’	1–2	1.3 (0.4)	1.2 (0.4)	1.3 (0.5)
einsam ‘lonely’	1–5	2.1 (1.2)	1.7 (1.1)	2.4 (1.4)
elegant ‘elegant’	1–7	3.2 (2.0)	3.9 (2.3)	2.5 (1.4)
emeritiert ‘retired’	1–5	1.7 (1.2)	1.5 (1.3)	1.8 (1.2)
empört ‘outraged’	1–7	3.2 (1.8)	2.7 (1.4)	3.6 (2.1)
energisch ‘energetic’	1–7	4.0 (1.9)	4.1 (2.0)	3.9 (1.8)
engagiert ‘involved’	1–7	4.0 (2.3)	4.4 (2.3)	3.6 (2.3)
enthusiastisch ‘enthusiastic’	1–7	4.2 (1.9)	3.7 (2.0)	4.6 (1.8)
entsetzt ‘horrified’	1–7	3.1 (1.6)	2.8 (0.9)	3.4 (2.1)
enttäuscht ‘disappointed’	1–7	3.3 (1.8)	4.2 (1.8)	2.3 (1.3)
entzückend ‘delightful’	1–7	3.8 (2.0)	3.6 (2.5)	4.0 (1.6)
erfahren ‘experienced’	1–7	2.5 (1.6)	2.6 (1.8)	2.4 (1.5)
erfolgreich ‘successful’	1–7	3.0 (2.1)	2.9 (1.7)	3.1 (2.4)
erleichtert ‘relieved’	1–7	2.7 (1.9)	2.4 (2.1)	2.9 (1.7)
ernst ‘serious’	1–7	3.8 (1.9)	4.1 (1.4)	3.4 (2.3)
erregt ‘excited’	1–7	3.3 (2.2)	3.0 (2.5)	3.6 (2.0)
errötet ‘flushed’	1–3	1.5 (0.7)	1.5 (0.7)	1.4 (0.7)
erschöpft ‘exhausted’	1–7	2.6 (1.8)	3.0 (2.2)	2.2 (1.3)
erstaunt ‘amazed’	1–7	3.3 (2.0)	4.0 (2.3)	2.6 (1.5)
erwachsen ‘grown up’	2–7	6.1 (1.4)	6.1 (1.5)	6.1 (1.3)
ethisch ‘ethical’	1–7	3.6 (1.8)	4.2 (1.9)	2.9 (1.6)
evangelisch ‘evangelical’	1–4	1.8 (1.0)	1.9 (0.9)	1.7 (1.1)
extravertiert ‘extroverted’	1–7	3.1 (2.4)	2.9 (2.5)	3.3 (2.5)
fachkompetent ‘competent’	1–7	4.4 (2.1)	4.8 (1.9)	4.0 (2.3)
fair ‘fair’	1–7	5.7 (1.9)	6.1 (1.0)	5.2 (2.5)
fantasielos ‘unimaginative’	1–7	3.9 (2.1)	4.9 (2.0)	2.9 (1.9)
fassungslos ‘stunned’	1–6	3.4 (1.8)	3.5 (2.0)	3.2 (1.8)
faul ‘lazy’	1–7	3.6 (2.0)	4.3 (2.1)	2.9 (1.7)
feminin ‘feminine’	1–7	4.9 (2.0)	4.6 (2.1)	5.1 (2.1)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
fett 'fat'	1–3	1.4 (0.7)	1.4 (0.7)	1.3 (0.7)
fit 'fit'	1–7	2.2 (1.6)	2.1 (1.4)	2.2 (1.9)
fleißig 'diligent'	1–7	3.6 (2.0)	4.0 (2.2)	3.1 (1.7)
folgsam 'obedient'	1–7	3.7 (2.1)	3.9 (1.5)	3.5 (2.6)
frech 'cheeky'	1–7	5.6 (1.8)	5.3 (2.2)	5.8 (1.5)
freundlich 'friendly'	2–7	5.8 (1.5)	6.3 (1.1)	5.3 (1.7)
friedliebend 'peace loving'	1–7	4.7 (2.1)	4.5 (2.0)	4.8 (2.3)
fröhlich 'happy'	1–7	4.3 (2.3)	4.8 (1.8)	3.8 (2.7)
fromm 'religious'	1–6	4.0 (1.5)	4.0 (1.5)	3.9 (1.6)
füllig 'plump'	1–3	1.5 (0.7)	1.3 (0.5)	1.7 (0.8)
furchtlos 'fearless'	3–7	5.6 (1.3)	5.0 (1.3)	6.1 (1.1)
fürsorglich 'caring'	2–7	5.2 (1.7)	4.7 (2.0)	5.6 (1.3)
gebildet 'educated'	1–7	3.6 (2.0)	3.8 (2.0)	3.3 (2.2)
geduldig 'patient'	1–7	4.9 (1.9)	4.7 (2.0)	5.1 (2.0)
gefährlich 'dangerous'	1–7	3.8 (2.3)	3.8 (2.7)	3.7 (2.0)
gehorsam 'obedient'	1–7	4.4 (2.2)	5.3 (1.3)	3.5 (2.6)
geimpft 'vaccinated'	1–7	1.8 (1.5)	2.0 (2.0)	1.5 (0.7)
gerissen 'cunning'	1–7	4.3 (2.0)	4.8 (2.1)	3.7 (1.9)
geschäftig 'busy'	1–7	3.5 (2.0)	3.0 (1.6)	3.9 (2.2)
geschminkt 'made up'	1–3	1.4 (0.6)	1.2 (0.4)	1.5 (0.7)
gesund 'healthy'	1–7	3.0 (2.2)	3.0 (1.9)	3.0 (2.5)
getauft 'baptized'	1–7	1.8 (1.5)	1.9 (2.0)	1.6 (0.7)
gewaltig 'powerful'	1–5	1.6 (1.3)	1.4 (1.3)	1.8 (1.3)
gierig 'greedy'	1–7	4.4 (2.0)	4.6 (1.8)	4.2 (2.2)
gläubig 'believing'	1–7	3.1 (2.0)	3.4 (2.0)	2.7 (2.1)
glücklich 'happy'	1–7	3.4 (2.0)	3.3 (2.4)	3.5 (1.7)
grauenhaft 'terrible'	1–7	5.7 (2.0)	5.3 (2.0)	6.1 (1.9)
groß 'large'	1–7	2.2 (1.7)	2.6 (2.2)	1.8 (0.9)
gutgläubig 'trusting'	1–7	4.2 (2.2)	4.5 (2.0)	3.8 (2.4)
gutherzig 'kind-hearted'	1–7	4.8 (1.9)	5.0 (2.1)	4.5 (1.7)
halberfolgreich 'semi-successful'	1–3	1.7 (0.8)	1.3 (0.5)	2.0 (0.9)
hartherzig 'hard-hearted'	1–7	5.2 (2.1)	5.9 (1.7)	4.4 (2.2)
hartnäckig 'persistent'	1–7	4.0 (2.1)	4.1 (1.9)	3.9 (2.4)
hässlich 'ugly'	1–6	2.8 (2.1)	2.2 (2.0)	3.3 (2.1)
hellwach 'wide awake'	1–6	2.5 (1.8)	3.0 (2.1)	2.0 (1.3)
hemmungslos 'uninhibited'	1–7	4.7 (1.9)	5.2 (1.6)	4.2 (2.0)
herzlich 'warm'	1–7	4.2 (1.9)	4.0 (2.1)	4.4 (1.8)
herzlos 'heartless'	1–7	5.5 (1.8)	5.4 (2.0)	5.6 (1.6)
heterosexuell 'heterosexual'	1–7	2.3 (1.6)	2.2 (1.0)	2.4 (2.1)
hochbegabt 'highly gifted'	1–7	1.9 (1.4)	1.9 (1.9)	1.8 (0.8)
hoffnungslos 'hopeless'	1–7	3.6 (2.1)	3.9 (2.1)	3.2 (2.2)
höflich 'polite'	1–7	5.3 (1.7)	5.0 (1.9)	5.5 (1.6)
homosexuell 'homosexual'	1–7	3.1 (1.9)	2.4 (1.4)	3.8 (2.3)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
hübsch ‘pretty’	1–5	1.7 (1.1)	1.3 (0.7)	2.0 (1.4)
humorvoll ‘humorous’	1–7	4.2 (1.9)	4.2 (1.9)	4.1 (2.0)
hungrig ‘hungry’	1–6	3.0 (1.7)	3.4 (1.8)	2.6 (1.7)
idealistisch ‘idealistic’	1–7	4.6 (1.8)	5.1 (1.4)	4.0 (2.1)
ignorant ‘ignorant’	1–7	5.1 (2.3)	5.7 (1.8)	4.4 (2.3)
impulsiv ‘impulsive’	2–7	4.8 (1.8)	4.9 (1.9)	4.7 (1.9)
inkompetent ‘incompetent’	1–7	4.9 (1.7)	4.3 (2.2)	5.5 (1.0)
inkonsequent ‘inconsistent’	1–7	5.1 (2.2)	6.1 (1.5)	4.1 (2.3)
intellektuell ‘intellectual’	1–7	3.9 (2.0)	3.7 (2.1)	4.1 (2.0)
intelligent ‘intelligent’	1–7	4.0 (2.1)	4.2 (2.1)	3.8 (2.2)
introvertiert ‘introverted’	1–7	3.9 (2.2)	3.9 (2.0)	3.9 (2.4)
ironisch ‘ironic’	1–7	2.6 (1.6)	2.2 (1.0)	3.0 (1.9)
italienisch ‘Italian’	1–7	3.3 (2.2)	3.1 (2.0)	3.5 (2.4)
jugendlich ‘youthful’	1–7	3.7 (2.0)	4.0 (2.1)	3.4 (1.9)
jung ‘young’	1–7	2.8 (1.6)	2.7 (1.3)	2.9 (1.9)
jungfräulich ‘virgin’	1–7	2.7 (1.8)	3.1 (2.0)	2.2 (1.4)
kalt ‘cold’	1–7	4.2 (2.2)	5.0 (1.8)	3.4 (2.4)
katholisch ‘Catholic’	1–7	2.3 (1.8)	1.7 (1.3)	2.8 (2.0)
kinderlieb ‘fond of children’	1–7	3.7 (1.9)	3.7 (2.0)	3.6 (2.0)
kindisch ‘childish’	1–7	6.2 (1.6)	6.4 (1.4)	6.0 (1.8)
kindlich ‘childlike’	3–7	5.9 (1.4)	6.1 (1.5)	5.7 (1.3)
klein ‘small’	1–7	2.0 (1.5)	1.9 (0.9)	2.1 (1.9)
kleinlich ‘petty’	1–7	4.8 (2.0)	4.0 (2.4)	5.6 (1.1)
klug ‘smart’	1–7	4.8 (2.1)	5.7 (1.5)	3.8 (2.3)
komatös ‘comatose’	1–4	1.6 (1.0)	2.0 (1.2)	1.2 (0.6)
konfirmiert ‘confirmed’	1–4	1.3 (0.8)	1.4 (1.0)	1.2 (0.6)
konzentriert ‘concentrated’	1–7	3.5 (1.9)	4.0 (1.9)	2.9 (1.7)
kräftig ‘strong’	1–5	1.8 (1.1)	1.4 (1.0)	2.1 (1.2)
krank ‘ill’	1–7	3.1 (2.0)	3.7 (2.5)	2.4 (1.1)
kritisch ‘critical’	1–7	4.3 (1.9)	4.9 (1.7)	3.6 (2.0)
lang ‘long’	1–3	1.3 (0.6)	1.3 (0.7)	1.2 (0.6)
laut ‘loud’	1–7	3.3 (2.0)	3.6 (2.0)	3.0 (2.1)
leichtsinnig ‘reckless’	1–7	5.4 (2.4)	6.1 (1.9)	4.6 (2.7)
leidenschaftlich ‘passionate’	1–7	3.9 (2.0)	3.3 (2.2)	4.5 (1.7)
leise ‘quiet’	1–7	4.4 (2.4)	5.8 (1.9)	3.0 (2.2)
leistungsfähig ‘efficient’	1–7	2.6 (1.5)	3.3 (1.7)	1.9 (1.0)
leseschwach ‘poor of reading’	1–6	1.9 (1.3)	2.4 (1.6)	1.4 (0.7)
liberal ‘liberal’	1–7	4.6 (2.1)	5.5 (1.8)	3.7 (2.1)
liebevoll ‘loving’	1–7	5.4 (1.9)	5.7 (1.6)	5.0 (2.2)
loyal ‘loyal’	2–7	6.1 (1.4)	6.2 (1.8)	5.9 (1.1)
lustig ‘funny’	1–7	4.1 (2.1)	4.6 (1.4)	3.6 (2.6)
mager ‘skinny’	1–3	1.5 (0.7)	1.3 (0.7)	1.7 (0.7)
magersüchtig ‘anorexic’	1–4	1.6 (1.0)	1.8 (1.0)	1.3 (1.0)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
männlich ‘male’	1–7	4.8 (2.2)	5.5 (1.8)	4.1 (2.4)
menschenscheu ‘afraid of people’	1–7	3.5 (2.2)	4.2 (2.4)	2.7 (1.8)
merkwürdig ‘strange’	2–7	6.6 (1.2)	6.5 (1.6)	6.6 (0.5)
minderjährig ‘underage’	1–7	2.5 (1.7)	2.1 (1.3)	2.9 (2.1)
misstrauisch ‘suspicious’	2–7	5.3 (1.8)	6.1 (1.7)	4.5 (1.6)
modern ‘modern’	1–7	3.0 (1.8)	3.4 (1.8)	2.6 (1.8)
modisch ‘stylish’	1–7	2.0 (1.4)	2.5 (1.7)	1.5 (0.7)
müde ‘tired’	1–7	2.8 (2.0)	3.4 (2.2)	2.1 (1.6)
munter ‘bright’	1–7	3.9 (2.1)	4.0 (2.1)	3.8 (2.2)
musikalisch ‘musical’	1–6	2.0 (1.4)	2.4 (1.7)	1.5 (0.9)
muskulös ‘muscular’	1–3	1.4 (0.6)	1.5 (0.7)	1.2 (0.4)
mutig ‘brave’	1–7	4.6 (2.2)	5.3 (1.6)	3.9 (2.5)
nachdenklich ‘thoughtful’	1–7	4.2 (1.9)	4.9 (1.5)	3.4 (2.1)
nachlässig ‘careless’	1–7	4.5 (1.8)	4.4 (2.0)	4.6 (1.6)
nackt ‘naked’	1–3	1.3 (0.6)	1.1 (0.3)	1.5 (0.7)
naiv ‘naive’	1–7	4.9 (2.2)	5.3 (1.9)	4.4 (2.4)
natürlich ‘natural’	1–7	5.6 (2.0)	6.4 (0.8)	4.7 (2.5)
neidisch ‘envious’	1–7	3.2 (2.0)	3.4 (2.3)	2.9 (1.7)
nervös ‘nervous’	1–7	4.3 (2.2)	4.8 (2.3)	3.7 (2.0)
nett ‘kind’	1–7	4.8 (2.5)	6.7 (0.7)	2.9 (2.1)
neu ‘new’	1–5	1.4 (1.1)	1.4 (1.3)	1.3 (1.0)
neugierig ‘curious’	1–7	4.1 (2.1)	5.1 (2.0)	3.0 (1.7)
niederländisch ‘Dutch’	1–7	2.1 (1.7)	2.2 (1.4)	2.0 (2.0)
nüchtern ‘sober’	1–7	3.0 (2.0)	3.2 (2.2)	2.7 (1.8)
ohnmächtig ‘unconscious’	1–7	1.7 (1.4)	2.1 (1.9)	1.3 (0.5)
optimistisch ‘optimistic’	2–7	4.7 (1.8)	4.7 (2.0)	4.7 (1.7)
organisiert ‘organized’	1–7	4.0 (2.0)	4.1 (1.7)	3.8 (2.3)
parteilos ‘impartial’	1–7	3.6 (2.2)	3.8 (2.0)	3.3 (2.5)
passiv ‘passive’	1–7	5.3 (1.8)	5.9 (1.1)	4.7 (2.2)
peinlich ‘embarrassing’	1–7	5.5 (1.8)	5.0 (1.7)	5.9 (1.9)
pensioniert ‘retired’	1–7	2.0 (1.5)	2.1 (2.0)	1.9 (0.9)
pervers ‘perverse’	1–7	4.5 (2.0)	4.1 (1.9)	4.8 (2.2)
pessimistisch ‘pessimistic’	1–7	3.7 (1.8)	4.3 (1.6)	3.1 (2.0)
pingelig ‘picky’	1–7	4.4 (2.3)	3.8 (2.4)	5.0 (2.0)
platt ‘dull’	1–7	2.2 (1.7)	3.1 (2.0)	1.3 (0.7)
pragmatisch ‘pragmatic’	1–7	4.8 (2.2)	6.0 (1.2)	3.6 (2.5)
professionell ‘professional’	5–7	6.5 (0.8)	6.6 (0.7)	6.4 (0.8)
promoviert ‘with a PhD’	1–3	1.7 (0.8)	1.4 (0.5)	2.0 (0.9)
raffiniert ‘refined’	1–7	3.9 (2.0)	4.9 (1.5)	2.8 (2.0)
realistisch ‘realistic’	1–7	4.0 (2.4)	3.9 (2.6)	4.0 (2.3)
rechtsextrem ‘extreme right’	1–7	4.1 (2.0)	4.3 (2.4)	3.9 (1.6)
reich ‘rich’	1–7	2.5 (1.8)	2.2 (1.3)	2.8 (2.3)
reif ‘mature’	1–7	5.4 (1.9)	5.8 (1.8)	5.0 (2.1)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
reserviert 'reserved'	2–7	5.1 (1.9)	6.1 (1.0)	4.1 (2.1)
respektlos 'disrespectful'	5–7	6.6 (0.8)	6.5 (0.9)	6.6 (0.8)
ritterlich 'chivalrous'	1–7	5.8 (1.8)	6.2 (1.5)	5.4 (2.0)
rücksichtsvoll 'considerate'	2–7	5.6 (1.4)	5.7 (1.4)	5.5 (1.5)
ruhig 'calm'	2–7	5.8 (1.6)	6.7 (0.7)	4.9 (1.8)
rührig 'active'	1–7	2.9 (1.8)	3.4 (2.1)	2.3 (1.3)
rundlich 'plump'	1–2	1.4 (0.5)	1.6 (0.5)	1.2 (0.4)
sachlich 'factual'	1–7	3.9 (1.7)	3.9 (1.9)	3.9 (1.6)
sangeslustig 'taking pleasure in singing'	1–7	2.7 (2.2)	2.1 (1.3)	3.3 (2.7)
sarkastisch 'sarcastic'	1–7	3.8 (2.1)	4.5 (2.2)	3.0 (1.8)
satt 'fed (up)'	1–4	1.5 (0.8)	1.4 (0.7)	1.6 (1.0)
sauer 'mad'	1–7	3.3 (2.3)	3.5 (2.7)	3.0 (1.8)
schläfrig 'sleepy'	1–7	3.2 (1.8)	3.2 (1.7)	3.1 (2.0)
schlagfertig 'quick-witted'	1–7	3.7 (2.2)	4.5 (2.2)	2.9 (1.9)
schlank 'slim'	1–4	1.5 (1.0)	1.6 (1.1)	1.3 (1.0)
schlau 'smart'	1–7	3.0 (2.1)	3.4 (2.6)	2.5 (1.4)
schön 'beautiful'	1–6	2.0 (1.5)	2.5 (1.8)	1.5 (0.8)
schwanger 'pregnant'	1–7	2.7 (1.9)	2.7 (1.5)	2.7 (2.3)
schwerkrank 'seriously ill'	1–7	2.2 (1.5)	2.5 (2.0)	1.9 (0.9)
schwermütig 'melancholic'	1–7	3.5 (2.0)	3.2 (2.0)	3.8 (2.0)
sehbehindert 'visually impaired'	1–6	1.7 (1.2)	1.7 (1.6)	1.6 (0.7)
selbstbewusst 'confident'	2–7	5.1 (1.5)	5.0 (1.5)	5.2 (1.5)
selbstlos 'selfless'	1–7	4.9 (2.2)	5.6 (1.4)	4.1 (2.6)
sexistisch 'sexist'	1–7	4.7 (2.1)	4.8 (2.5)	4.5 (1.7)
sexy 'sexy'	1–7	3.8 (1.9)	4.6 (1.7)	3.0 (1.7)
skeptisch 'skeptical'	1–7	4.4 (2.1)	4.3 (2.2)	4.5 (2.1)
skrupellos 'unscrupulous'	1–7	5.7 (1.5)	6.2 (0.9)	5.2 (1.8)
sorgenfrei 'carefree'	1–7	3.8 (1.7)	4.1 (1.9)	3.4 (1.4)
sorgfältig 'careful'	1–6	3.3 (1.5)	2.7 (1.3)	3.9 (1.5)
spanisch 'Spanish'	1–7	2.1 (1.6)	2.0 (2.0)	2.2 (1.2)
sparsam 'thrifty'	1–7	3.5 (2.0)	4.1 (2.0)	2.8 (1.9)
spontan 'spontaneous'	1–7	3.0 (2.0)	3.3 (1.8)	2.6 (2.2)
sportlich 'athletic'	1–7	3.4 (2.0)	3.2 (2.4)	3.5 (1.7)
sprachbehindert 'speech impaired'	1–5	2.0 (1.5)	2.5 (1.8)	1.5 (1.0)
sprachlos 'speechless'	1–7	1.8 (1.5)	2.2 (1.9)	1.3 (0.5)
stark 'strong'	1–7	3.3 (1.9)	3.7 (1.6)	2.9 (2.1)
stolz 'proud'	1–7	3.9 (2.1)	4.2 (2.0)	3.6 (2.3)
sympathisch 'likable'	1–7	4.0 (2.1)	4.5 (1.8)	3.4 (2.4)
taktvoll 'tactful'	3–7	6.1 (1.1)	6.1 (1.3)	6.1 (1.0)
talentiert 'talented'	1–7	2.9 (2.1)	2.7 (2.5)	3.0 (1.8)
tätowiert 'tattooed'	1–3	1.4 (0.7)	1.6 (0.8)	1.1 (0.3)
temperamentvoll 'spirited'	1–7	4.7 (2.1)	4.8 (1.8)	4.5 (2.6)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
teuflisch 'devilish'	1–7	4.7 (2.0)	4.0 (1.8)	5.4 (2.0)
todernst 'dead serious'	1–7	4.5 (2.0)	4.6 (1.9)	4.3 (2.2)
todkrank 'terminally ill'	1–7	3.0 (1.8)	3.1 (2.2)	2.9 (1.3)
tolerant 'tolerant'	2–7	5.6 (1.7)	6.0 (1.8)	5.1 (1.7)
topmotiviert 'highly motivated'	1–7	4.6 (1.5)	4.9 (1.3)	4.2 (1.8)
tot 'dead'	1–3	1.4 (0.7)	1.6 (0.8)	1.2 (0.4)
traurig 'sad'	1–7	3.7 (2.0)	3.6 (2.4)	3.7 (1.8)
treu 'loyal'	1–7	4.0 (2.2)	5.0 (1.5)	3.0 (2.5)
tüchtig 'capable'	1–7	4.5 (2.1)	4.5 (2.1)	4.4 (2.3)
überfordert 'overwhelmed'	1–6	2.7 (1.8)	2.2 (1.6)	3.2 (1.9)
übergewichtig 'overweight'	1–3	1.4 (0.7)	1.7 (0.8)	1.1 (0.3)
überglücklich 'overjoyed'	1–7	4.3 (2.2)	4.3 (2.4)	4.2 (2.1)
übermüdet 'overtired'	1–7	3.4 (1.9)	3.4 (2.3)	3.4 (1.4)
überrascht 'surprised'	1–7	4.0 (1.8)	4.0 (2.1)	4.0 (1.6)
unaufdringlich 'unobtrusive'	1–7	4.8 (2.0)	5.3 (1.8)	4.2 (2.2)
unbelastet 'unencumbered'	1–7	2.8 (2.1)	3.0 (2.0)	2.5 (2.3)
unbesorgt 'unconcerned'	1–7	3.6 (1.9)	4.2 (2.1)	3.0 (1.6)
unfähig 'unable'	1–7	3.3 (2.0)	2.8 (1.4)	3.8 (2.4)
unfruchtbar 'infertile'	1–3	1.3 (0.7)	1.4 (0.7)	1.2 (0.6)
ungläubig 'incredulous'	1–7	2.5 (1.9)	2.9 (2.3)	2.1 (1.4)
unhöflich 'impolite'	1–7	5.9 (2.0)	5.3 (2.6)	6.5 (0.9)
unmusikalisch 'unmusical'	1–6	2.1 (1.3)	2.5 (1.6)	1.6 (0.8)
unruhig 'restless'	1–7	5.5 (2.0)	6.0 (1.7)	4.9 (2.2)
unschuldig 'innocent'	1–7	5.2 (2.1)	6.3 (1.6)	4.1 (2.0)
unsensibel 'insensitive'	2–7	5.8 (1.3)	5.5 (1.6)	6.0 (1.1)
unsterblich 'immortal'	1–7	2.4 (1.8)	2.4 (2.1)	2.3 (1.5)
unterzuckert 'hypoglycemic'	1–7	2.6 (2.0)	2.1 (1.5)	3.1 (2.3)
unverschämt 'outrageous'	1–7	5.6 (1.7)	5.0 (2.2)	6.1 (0.9)
unzufrieden 'dissatisfied'	1–7	3.2 (1.9)	3.4 (1.8)	3.0 (2.0)
unzuverlässig 'unreliable'	1–7	4.7 (2.3)	5.8 (1.4)	3.5 (2.5)
verärgert 'upset'	1–7	4.1 (2.3)	4.4 (2.3)	3.8 (2.4)
verblüfft 'perplexed'	1–7	3.4 (2.0)	3.4 (1.7)	3.4 (2.3)
vergesslich 'forgetful'	1–4	1.7 (0.9)	2.0 (1.1)	1.3 (0.7)
verheiratet 'married'	1–6	1.7 (1.3)	2.0 (1.7)	1.3 (0.7)
verkleidet 'disguised'	1–3	1.6 (0.8)	1.4 (0.7)	1.7 (1.0)
verletzt 'hurt'	1–6	3.0 (1.8)	2.9 (1.9)	3.0 (1.7)
verliebt 'in love'	1–7	4.4 (1.9)	4.2 (1.8)	4.5 (2.0)
verlobt 'engaged'	1–7	1.9 (1.4)	2.1 (1.9)	1.7 (0.8)
vernünftig 'reasonable'	2–7	6.0 (1.6)	5.8 (1.7)	6.2 (1.6)
verrückt 'insane'	3–7	5.8 (1.3)	5.8 (1.2)	5.7 (1.4)
verschmitzt 'mischievous'	1–5	2.6 (1.4)	2.5 (1.4)	2.7 (1.4)
verschmust 'cuddly'	1–7	2.7 (1.7)	2.4 (1.3)	2.9 (2.1)
verwaist 'orphaned'	1–5	1.7 (1.2)	1.9 (1.4)	1.4 (1.0)

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Table B.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)		
		overall	*verhalten*	*benehmen*
verwirrt 'confused'	1–6	3.2 (1.8)	2.6 (2.1)	3.8 (1.1)
verwitwet 'widowed'	1–3	1.5 (0.7)	1.7 (0.8)	1.2 (0.4)
vielseitig 'versatile'	1–6	2.2 (1.4)	1.7 (1.0)	2.7 (1.7)
volljährig 'of age'	1–7	2.5 (1.9)	2.6 (1.7)	2.4 (2.1)
vorbildlich 'exemplary'	1–7	6.3 (1.5)	6.2 (1.9)	6.4 (0.8)
vorsichtig 'careful'	1–7	4.8 (1.9)	4.9 (1.7)	4.6 (2.1)
wach 'awake'	1–7	2.4 (1.7)	2.4 (2.1)	2.4 (1.4)
wahnsinnig 'insane'	1–7	4.3 (1.9)	4.6 (1.6)	4.0 (2.2)
weiblich 'female'	1–7	4.2 (2.2)	4.2 (2.2)	4.1 (2.2)
weise 'wise'	1–7	5.0 (2.0)	5.0 (2.1)	4.9 (2.0)
wohlwollend 'benevolent'	1–7	4.5 (2.0)	4.8 (2.1)	4.2 (2.0)
wunderschön 'beautiful'	1–7	2.1 (1.5)	2.0 (1.9)	2.2 (0.9)
wütend 'furious'	1–7	3.2 (2.2)	3.5 (2.4)	2.8 (2.0)
zappelig 'fidgety'	1–7	3.9 (2.4)	3.9 (2.2)	3.8 (2.7)
zielbewusst 'purposeful'	1–7	4.1 (1.8)	4.6 (1.8)	3.5 (1.7)
zielstrebig 'determined'	1–7	4.9 (2.3)	5.4 (2.1)	4.3 (2.5)
zögerlich 'hesitant'	1–7	3.7 (2.0)	4.1 (2.1)	3.2 (1.8)
zufrieden 'satisfied'	1–7	4.0 (2.2)	4.8 (1.8)	3.2 (2.3)
zurückhaltend 'reserved'	1–7	5.6 (2.0)	6.1 (1.2)	5.1 (2.5)
zutraulich 'trusting'	1–7	3.6 (2.0)	4.1 (2.4)	3.1 (1.4)
zuverlässig 'reliable'	1–7	3.8 (2.1)	3.7 (2.3)	3.9 (2.0)
zuversichtlich 'confident'	1–7	4.2 (2.1)	4.9 (1.9)	3.5 (2.3)
zynisch 'cynical'	1–7	4.7 (2.2)	5.2 (1.9)	4.1 (2.4)

C
Items Used in Experiment 2

Table C.1: Item sentences used in Experiment 2. The missing two conditions are identical to these sentences with the exception of the verb *verhielt sich*.

NR	Sentence
1	Andrea war abweisend, und zwar um das Date schneller zu beenden.
1	Andrea war abweisend, und zwar weil das Date sie tierisch langweilte.
2	Anja war aggressiv, und zwar um die Rivalin zu irritieren.
2	Anja war aggressiv, und zwar weil die Rivalin sie irritierte.
3	Anna war altmodisch, und zwar um den Stiefvater nicht zu verärgern.
3	Anna war altmodisch, und zwar weil den Stiefvater Neues verärgerte.
4	Beate war aufmerksam, und zwar um die Vögel im richtigen Moment zu erwischen.
4	Beate war aufmerksam, und zwar weil die Vögel sie ganz in ihren Bann zogen.
5	Svenja war barbarisch, und zwar um die Wikinger für sich zu gewinnen.
5	Svenja war barbarisch, und zwar weil die Wikinger ihre Frauen so mochten.
6	Clara war bescheiden, und zwar um die Stiefmutter von sich zu überzeugen.
6	Clara war bescheiden, und zwar weil die Stiefmutter ihr das anerzogen hat.
7	Elena war chaotisch, und zwar um ihre Kreativität zu kultivieren.
7	Elena war chaotisch, und zwar weil ihre Kreativität überschäumte.
8	Yannik war charmant, und zwar um seine Mutter von sich abzulenken.
8	Yannik war charmant, und zwar weil seine Mutter ihn gut erzogen hatte.
9	Elisa war defensiv, und zwar um die Anwälte aus dem Konzept zu bringen.
9	Elisa war defensiv, und zwar weil die Anwälte ihr Vorwürfe gemacht haben.
10	Hannah war eigenwillig, und zwar um die Erzieher damit zu ärgern.
10	Hannah war eigenwillig, und zwar weil die Erzieher versagt haben.
11	Helena war energisch, und zwar um das Laufen hinter sich zu bringen.
11	Helena war energisch, und zwar weil das Laufen sie mit Kraft erfüllte.
12	Helga war engagiert, und zwar um die Arbeit schnell zu erledigen.
12	Helga war engagiert, und zwar weil die Arbeit ihr viel Spaß machte.
13	Jana war erwachsen, und zwar um Wodka für die Party zu kaufen.
13	Jana war erwachsen, und zwar weil Wodka an Erwachsene verkauft wird.
14	Sophie war freundlich, und zwar um die Eltern stolz auf sie zu machen.

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Table C.1 – *Continued from previous page*

NR	Sentence
14	Sophie war freundlich, und zwar weil die Eltern sie gut erzogen haben.
15	Jasmin war fröhlich, und zwar um ihre Laune zu verbessern.
15	Jasmin war fröhlich, und zwar weil ihre Laune sich verbesserte.
16	Julia war gehorsam, und zwar um die Großeltern wieder zu beruhigen.
16	Julia war gehorsam, und zwar weil die Großeltern darauf geachtet haben.
17	Katja war gerissen, und zwar um dem Detektiv ein Schnippchen zu schlagen.
17	Katja war gerissen, und zwar weil dem Detektiv ihre Ausbildung wichtig war.
18	Laura war gierig, und zwar um die Schätze sich zu schnappen.
18	Laura war gierig, und zwar weil die Schätze sie bezauberten.
19	Leonie war gutgläubig, und zwar um ihre Naivität als Alibi zu nutzen.
19	Leonie war gutgläubig, und zwar weil ihre Naivität sie beschützt hat.
20	Linda war gutherzig, und zwar um die Hexe zu täuschen.
20	Linda war gutherzig, und zwar weil die Hexe sie verzauberte.
21	Lisa war hartherzig, und zwar um die Scheidung zu erschweren.
21	Lisa war hartherzig, und zwar weil die Scheidung sie schwer traf.
22	Marie war hartnäckig, und zwar um Kompromisse zu vermeiden.
22	Marie war hartnäckig, und zwar weil Kompromisse sie ärgerten.
23	Miriam war hemmungslos, und zwar um ihre Fantasien in Gänze auszuleben.
23	Miriam war hemmungslos, und zwar weil ihre Fantasien sie kontrollierten.
24	Nadine war humorvoll, und zwar um die Atmosphäre zu entspannen.
24	Nadine war humorvoll, und zwar weil die Atmosphäre sich entspannte.
25	Sabine war ignorant, und zwar um ihren Mann absichtlich zu verärgern.
25	Sabine war ignorant, und zwar weil ihren Mann das nicht interessierte.
26	Sandra war impulsiv, und zwar um ihre Lehrer auf die Palme zu treiben.
26	Sandra war impulsiv, und zwar weil ihre Lehrer sie nie maßregeln konnten.
27	Saskia war kindisch, und zwar um ihren Vater zu verärgern.
27	Saskia war kindisch, und zwar weil ihren Vater das nicht störte.
28	Paul war kritisch, und zwar um die Azubis herauszufordern.
28	Paul war kritisch, und zwar weil die Azubis viel Mist bauten.
29	Verena war liberal, und zwar um den Studenten viel Freiheit einzuräumen.
29	Verena war liberal, und zwar weil den Studenten ihre Freiheit wichtig war.
30	Adam war liebevoll, und zwar um die Kinder zu beruhigen.
30	Adam war liebevoll, und zwar weil die Kinder ihn entzückten.
31	Alex war lustig, und zwar um die Clowns von sich zu überzeugen.
31	Alex war lustig, und zwar weil die Clowns ihm viel beigebracht hatten.
32	Armin war männlich, und zwar um die Freundin zu beeindrucken.
32	Armin war männlich, und zwar weil die Freundin das attraktiv fand.
33	Daniel war nachlässig, und zwar um die Arbeit auf andere abzuwälzen.
33	Daniel war nachlässig, und zwar weil die Arbeit ihn sehr langweilte.
34	Dennis war natürlich, und zwar um seine Persönlichkeit zu zeigen.
34	Dennis war natürlich, und zwar weil seine Persönlichkeit beliebt war.
35	Janina war nervös, und zwar um der Jury Angst vorzuspielen.
35	Janina war nervös, und zwar weil der Jury ihr Alibi suspekt war.
36	Fritz war neugierig, und zwar um das Geheimnis zu enthüllen.
36	Fritz war neugierig, und zwar weil das Geheimnis ihn faszinierte.
37	Heiko war passiv, und zwar um seine Frau nicht aufzubringen.
37	Heiko war passiv, und zwar weil seine Frau die Pflichten übernahm.
38	Holger war pragmatisch, und zwar um seine Ziele schneller zu erreichen.
38	Holger war pragmatisch, und zwar weil seine Ziele angemessen gesetzt waren.
39	Jakob war reserviert, und zwar um seine Gefühle besser zu verbergen.
39	Jakob war reserviert, und zwar weil seine Gefühle ihn verlassen hatten.

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Table C.1 – *Continued from previous page*

NR	Sentence
40	Thomas war ritterlich, und zwar um seine Treue der Gräfin zu zeigen.
40	Thomas war ritterlich, und zwar weil seine Treue so grenzenlos war.
41	Jannik war selbstlos, und zwar um die Kameraden für sich zu gewinnen.
41	Jannik war selbstlos, und zwar weil die Kameraden alle zusammenhielten.
42	Jonas war sexistisch, und zwar um die Frau einzuschüchtern.
42	Jonas war sexistisch, und zwar weil die Frau ihn einschüchterte.
43	Karl war skeptisch, und zwar um die Theorie in Frage zu stellen.
43	Karl war skeptisch, und zwar weil die Theorie einige Lücken aufwies.
44	Kilian war skrupellos, und zwar um die Konkurrenz konsequent auszuschalten.
44	Kilian war skrupellos, und zwar weil die Konkurrenz aus Verbrechern bestand.
45	Klaus war taktvoll, und zwar um Rücksicht auf andere zu nehmen.
45	Klaus war taktvoll, und zwar weil Rücksicht seine Stärke war.
46	Lorenz war todernst, und zwar um die Geschäftslage klar darzustellen.
46	Lorenz war todernst, und zwar weil die Geschäftslage sich verschlechterte.
47	Nils war tolerant, und zwar um den Touristen eine weitere Chance zu geben.
47	Nils war tolerant, und zwar weil den Touristen die Gebräuche unbekannt waren.
48	Lukas war überrascht, und zwar um seine Freunde nicht zu enttäuschen.
48	Lukas war überrascht, und zwar weil seine Freunde seine Frau kannten.
49	Manuel war unruhig, und zwar um die Verdächtigen hinters Licht zu führen.
49	Manuel war unruhig, und zwar weil die Verdächtigen viele Waffen hatten.
50	Marc war unschuldig, und zwar um die Agenten in Sicherheit zu wiegen.
50	Marc war unschuldig, und zwar weil die Agenten die Tat begangen hatten.
51	Martin war verärgert, und zwar um seine Unzufriedenheit zu zeigen.
51	Martin war verärgert, und zwar weil seine Unzufriedenheit gewachsen war.
52	Ludwig war verrückt, und zwar um die Ärzte zu erschrecken.
52	Ludwig war verrückt, und zwar weil die Ärzte ihn erschreckten.
53	Oliver war vorsichtig, und zwar um die Fallen zu vermeiden.
53	Oliver war vorsichtig, und zwar weil die Fallen ihm Angst machten.
54	Pascal war wahnsinnig, und zwar um die Medikamente zu bekommen.
54	Pascal war wahnsinnig, und zwar weil die Medikamente nicht anschlugen.
55	Sonja war weiblich, und zwar um ihre Figur zu betonen.
55	Sonja war weiblich, und zwar weil ihre Figur üppig war.
56	Tobias war wohlwollend, und zwar um die Lehrlinge besser zu betreuen.
56	Tobias war wohlwollend, und zwar weil die Lehrlinge gute Arbeit leisteten.
57	Robin war zielbewusst, und zwar um das Studium schnell abzuschließen.
57	Robin war zielbewusst, und zwar weil das Studium ihn das gelehrt hatte.
58	Peter war zielstrebig, und zwar um die Ausbildung erfolgreich zu beenden.
58	Peter war zielstrebig, und zwar weil die Ausbildung ihn tief geprägt hatte.
59	Simon war zufrieden, und zwar um die Kunden von dem Deal zu überzeugen.
59	Simon war zufrieden, und zwar weil die Kunden reichlich seine Waren kauften.
60	Stefan war zynisch, und zwar um die Debatte aufzuheizen.
60	Stefan war zynisch, und zwar weil die Debatte ihn langweilte.

D
Control Conditions in Experiment 4

Table D.1: Control conditions used in Experiment 5.

Sentences with *um … zu*	
NR	Sentence
101	Maria fuhr nach Brasilien, und zwar um dort Urlaub zu machen.
102	Die Polizei bittet um Hilfe, und zwar um einen Gewalttäter zu finden.
103	Die Schüler kamen zum Infoabend, und zwar um sich über die Kurse zu informieren.
104	Julia fuhr in die Stadt, und zwar um sich mit Freunden zu treffen.
105	Adele wechselte an das MIT, und zwar um dort ihren Doktor zu erlangen.
106	Der Schüler rannte zur Haltestelle, und zwar um die Straßenbahn zu erreichen.
107	Der Rentner nutzte Schlafmittel, und zwar um wieder schlafen zu können.
108	Die Autorin arbeitete Tag und Nacht, und zwar um ihren Roman fertigzuschreiben.
109	Sonja benahm sich schlecht, und zwar um auf sich aufmerksam zu machen.
110	Der Prinz nutzte diese Gelegenheit, und zwar um den Thron zurück zu erobern.
111	Die Welpen jaulten besonders laut, und zwar um ihre Mutter wiederzufinden.
112	Agamemnon verließ Mykene, und zwar um in den Trojanischen Krieg zu ziehen.
113	Der Sultan reiste nach Mumbai, und zwar um mit dem Raja Verhandlungen zu führen.
114	Der Angler fischte am See, und zwar um mehr Fische zu fangen.
115	Waldfried flog auf die Bahamas, und zwar um einen Film zu drehen.
116	Karin fuhr in ihren Geburtsort, und zwar um Bekannte zu besuchen.
117	Die Firma brauchte Veränderungen, und zwar um wieder konkurrenzfähig zu werden.
118	Aylin reiste nach Ankara, und zwar um ihre verlorengeglaubte Schwester kennenzulernen.

Continued on next page

Table D.1 – *Continued from previous page*

NR	Sentence
119	Die Musiker übten jede Woche, und zwar um sich für das Konzert vorzubereiten.
120	Finn verkaufte Drogen, und zwar um sein Einkommen aufzubessern.
121	Alisa fuhr nach Ägypten, und zwar um Sonne zu tanken und auszuspannen.
122	Veronika rudert beim Verein, und zwar um fit und schlank zu bleiben.
123	Die Frau trug sehr viel Makeup, und zwar um ihrem Date zu gefallen.
124	Das Mädchen lernte jeden Tag, und zwar um die Deutschprüfung zu bestehen.
125	Ilona fuhr nach Berlin, und zwar um sich behandeln zu lassen.
126	Der Politiker tritt vom Amt zurück, und zwar um sich neuen Aufgaben zu widmen.
127	Richard ging ins Fitnessstudio, und zwar um Muskeln aufzubauen.
128	Liam verließ den Zirkus, und zwar um eine Weltreise zu machen.
129	Die Armee marschierte die ganze Nacht, und zwar um den Feind am morgen zu überraschen.
130	Der Junge drängte sich durch die Menge, und zwar um noch einen Sitzplatz zu ergattern.
	Sentences with *weil*
131	Frieda ging zum Arzt, und zwar weil sie plötzliche Krampfanfälle bekam.
132	Das Schiff verließ den Hafen nicht, und zwar weil die Wellen zu groß waren.
133	Natalie weinte heute, und zwar weil sie nicht ins Kino gehen durfte.
134	Allingham vollendete ihr Buch nicht, und zwar weil sie an Krebs erkrankte.
135	Silke öffnete das Fenster, und zwar weil das Wetter so schön war.
136	Jenna lehnte den Heiratsantrag ab, und zwar weil sie den Mann nicht mehr liebte.
137	Aaron verspätete sich zum Treffen, und zwar weil sein Auto kaputt gegangen war.
138	Die Frau verließ den Saal, und zwar weil sie ungerecht behandelt wurde.
139	Der Koch lächelte die Kellnerin an, und zwar weil er sie schon lange liebte.
140	Der Streit eskalierte plötzlich, und zwar weil der Jugendliche ein Messer gezückt hatte.
141	Hans arbeitete im Verlagswesen, und zwar weil ihm das Spaß machte.
142	Susanna flüchtete aus dem Wasser, und zwar weil sie einen Hai gesehen hatte.
143	Luise lehnte das Angebot ab, und zwar weil sie Zürich nicht verlassen wollte.
144	Der Politiker kritisierte den Plan, und zwar weil die Kosten zu hoch waren.
145	Diana zahlte eine höhere Strafe, und zwar weil sie einschlägig polizeibekannt war.
146	Der Ingenieur riet davon ab, und zwar weil das Risiko zu hoch war.
147	Der Lehrer blieb in Mainz, und zwar weil er dort eine Stelle bekommen hat.
148	Xenia kam spät nach Hause, und zwar weil sie noch viel Arbeit hatte.
149	Karla hatte heftige Schmerzen, und zwar weil ihr Beinbruch besonders kompliziert war.
150	Greta bekam schlechte Noten, und zwar weil sie nie lernen wollte.
151	Maike trank keinen Wein, und zwar weil sie noch Auto fahren musste.
152	Lukas mochte Lara nicht, und zwar weil sie so unangenehm roch.
153	Paula verpasste die Vorlesung, und zwar weil ihr Wecker nicht geklingelt hatte.
154	Simon eilte nach Hause, und zwar weil ein Sturm bald aufzog.
155	Titus ging ins Reisebüro, und zwar weil er eine Reise buchen wollte.
156	Der Vermieter ging vor Gericht, und zwar weil die Mieterin nie bezahlt hatte.
157	Kalle feuerte die Sekretärin, und zwar weil sie ihre Aufgaben nicht erledigte.

Continued on next page

Table D.1 – *Continued from previous page*

NR	Sentence
158	Vera musste fliehen, und zwar weil sie politisch verfolgt wurde.
159	Martin lud alle Kollegen ein, und zwar weil sie das Projekt endlich abgeschlossen hatten.
160	Michael mähte den Rasen nicht, und zwar weil der Rasenmäher kaputt gegangen ist.

E
Items Used in Experiment 6

Table E.1: Item sentences used in Experiment 6. There were two conditions in the canonical word order which are omitted here for brevity. They differed from the copular sentences only in that the verb was *verhielt sich* instead of *war*.

NR	Sentence
1	Andrea war abweisend, um das Date schneller zu beenden.
1	Andrea war abweisend, weil das Date sie tierisch langweilte.
1	Um das Date schneller zu beenden, war Andrea abweisend.
1	Weil das Date sie tierisch langweilte, war Andrea abweisend.
2	Anja war aggressiv, um die Rivalin zu irritieren.
2	Anja war aggressiv, weil die Rivalin sie irritierte.
2	Um die Rivalin zu irritieren, war Anja aggressiv.
2	Weil die Rivalin sie irritierte, war Anja aggressiv.
3	Anna war altmodisch, um den Stiefvater nicht zu verärgern.
3	Anna war altmodisch, weil den Stiefvater Neues verärgerte.
3	Um den Stiefvater nicht zu verärgern, war Anna altmodisch.
3	Weil den Stiefvater Neues verärgerte, war Anna altmodisch.
4	Beate war aufmerksam, um die Vögel im richtigen Moment zu erwischen.
4	Beate war aufmerksam, weil die Vögel sie ganz in ihren Bann zogen.
4	Um die Vögel im richtigen Moment zu erwischen, war Beate aufmerksam.
4	Weil die Vögel sie ganz in ihren Bann zogen, war Beate aufmerksam.
5	Svenja war barbarisch, um die Wikinger für sich zu gewinnen.
5	Svenja war barbarisch, weil die Wikinger ihre Frauen so mochten.
5	Um die Wikinger für sich zu gewinnen, war Svenja barbarisch.
5	Weil die Wikinger ihre Frauen so mochten, war Svenja barbarisch.
6	Clara war bescheiden, um die Stiefmutter von sich zu überzeugen.
6	Clara war bescheiden, weil die Stiefmutter ihr das anerzogen hat.
6	Um die Stiefmutter von sich zu überzeugen, war Clara bescheiden.
6	Weil die Stiefmutter ihr das anerzogen hat, war Clara bescheiden.
7	Elena war chaotisch, um ihre Kreativität zu kultivieren.
7	Elena war chaotisch, weil ihre Kreativität überschäumte.

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Table E.1 – *Continued from previous page*

NR	Sentence
7	Um ihre Kreativität zu kultivieren, war Elena chaotisch.
7	Weil ihre Kreativität überschäumte, war Elena chaotisch.
8	Yannik war charmant, um seine Mutter von sich abzulenken.
8	Yannik war charmant, weil seine Mutter ihn gut erzogen hatte.
8	Um seine Mutter von sich abzulenken, war Yannik charmant.
8	Weil seine Mutter ihn gut erzogen hatte, war Yannik charmant.
9	Elisa war defensiv, um die Anwälte aus dem Konzept zu bringen.
9	Elisa war defensiv, weil die Anwälte ihr Vorwürfe gemacht haben.
9	Um die Anwälte aus dem Konzept zu bringen, war Elisa defensiv.
9	Weil die Anwälte ihr Vorwürfe gemacht haben, war Elisa defensiv.
10	Hannah war eigenwillig, um die Erzieher damit zu ärgern.
10	Hannah war eigenwillig, weil die Erzieher versagt haben.
10	Um die Erzieher damit zu ärgern, war Hannah eigenwillig.
10	Weil die Erzieher versagt haben, war Hannah eigenwillig.
11	Helena war energisch, um das Laufen hinter sich zu bringen.
11	Helena war energisch, weil das Laufen sie mit Kraft erfüllte.
11	Um das Laufen hinter sich zu bringen, war Helena energisch.
11	Weil das Laufen sie mit Kraft erfüllte, war Helena energisch.
12	Helga war engagiert, um die Arbeit schnell zu erledigen.
12	Helga war engagiert, weil die Arbeit ihr viel Spaß machte.
12	Um die Arbeit schnell zu erledigen, war Helga engagiert.
12	Weil die Arbeit ihr viel Spaß machte, war Helga engagiert.
13	Jana war erwachsen, um Wodka für die Party zu kaufen.
13	Jana war erwachsen, weil Wodka an Erwachsene verkauft wird.
13	Um Wodka für die Party zu kaufen, war Jana erwachsen.
13	Weil Wodka an Erwachsene verkauft wird, war Jana erwachsen.
14	Sophie war freundlich, um die Eltern stolz auf sie zu machen.
14	Sophie war freundlich, weil die Eltern sie gut erzogen haben.
14	Um die Eltern stolz auf sie zu machen, war Sophie freundlich.
14	Weil die Eltern sie gut erzogen haben, war Sophie freundlich.
15	Jasmin war fröhlich, um ihre Laune zu verbessern.
15	Jasmin war fröhlich, weil ihre Laune sich verbesserte.
15	Um ihre Laune zu verbessern, war Jasmin fröhlich.
15	Weil ihre Laune sich verbesserte, war Jasmin fröhlich.
16	Julia war gehorsam, um die Großeltern wieder zu beruhigen.
16	Julia war gehorsam, weil die Großeltern darauf geachtet haben.
16	Um die Großeltern wieder zu beruhigen, war Julia gehorsam.
16	Weil die Großeltern darauf geachtet haben, war Julia gehorsam.
17	Katja war gerissen, um dem Detektiv ein Schnippchen zu schlagen.
17	Katja war gerissen, weil dem Detektiv ihre Ausbildung wichtig war.
17	Um dem Detektiv ein Schnippchen zu schlagen, war Katja gerissen.
17	Weil dem Detektiv ihre Ausbildung wichtig war, war Katja gerissen.
18	Laura war gierig, um die Schätze sich zu schnappen.
18	Laura war gierig, weil die Schätze sie bezauberten.
18	Um die Schätze sich zu schnappen, war Laura gierig.
18	Weil die Schätze sie bezauberten, war Laura gierig.
19	Leonie war gutgläubig, um ihre Naivität als Alibi zu nutzen.
19	Leonie war gutgläubig, weil ihre Naivität sie beschützt hat.
19	Um ihre Naivität als Alibi zu nutzen, war Leonie gutgläubig.
19	Weil ihre Naivität sie beschützt hat, war Leonie gutgläubig.
20	Linda war gutherzig, um die Hexe zu täuschen.

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Table E.1 – *Continued from previous page*

NR	Sentence
20	Linda war gutherzig, weil die Hexe sie verzauberte.
20	Um die Hexe zu täuschen, war Linda gutherzig.
20	Weil die Hexe sie verzauberte, war Linda gutherzig.
21	Lisa war hartherzig, um die Scheidung zu erschweren.
21	Lisa war hartherzig, weil die Scheidung sie schwer traf.
21	Um die Scheidung zu erschweren, war Lisa hartherzig.
21	Weil die Scheidung sie schwer traf, war Lisa hartherzig.
22	Marie war hartnäckig, um Kompromisse zu vermeiden.
22	Marie war hartnäckig, weil Kompromisse sie ärgerten.
22	Um Kompromisse zu vermeiden, war Marie hartnäckig.
22	Weil Kompromisse sie ärgerten, war Marie hartnäckig.
23	Miriam war hemmungslos, um ihre Fantasien in Gänze auszuleben.
23	Miriam war hemmungslos, weil ihre Fantasien sie kontrollierten.
23	Um ihre Fantasien in Gänze auszuleben, war Miriam hemmungslos.
23	Weil ihre Fantasien sie kontrollierten, war Miriam hemmungslos.
24	Nadine war humorvoll, um die Atmosphäre zu entspannen.
24	Nadine war humorvoll, weil die Atmosphäre sich entspannte.
24	Um die Atmosphäre zu entspannen, war Nadine humorvoll.
24	Weil die Atmosphäre sich entspannte, war Nadine humorvoll.
25	Sabine war ignorant, um ihren Mann absichtlich zu verärgern.
25	Sabine war ignorant, weil ihren Mann das nicht interessierte.
25	Um ihren Mann absichtlich zu verärgern, war Sabine ignorant.
25	Weil ihren Mann das nicht interessierte, war Sabine ignorant.
26	Sandra war impulsiv, um ihre Lehrer auf die Palme zu treiben.
26	Sandra war impulsiv, weil ihre Lehrer sie nie maßregeln konnten.
26	Um ihre Lehrer auf die Palme zu treiben, war Sandra impulsiv.
26	Weil ihre Lehrer sie nie maßregeln konnten, war Sandra impulsiv.
27	Saskia war kindisch, um ihren Vater zu verärgern.
27	Saskia war kindisch, weil ihren Vater das nicht störte.
27	Um ihren Vater zu verärgern, war Saskia kindisch.
27	Weil ihren Vater das nicht störte, war Saskia kindisch.
28	Petra war kritisch, um die Azubis herauszufordern.
28	Petra war kritisch, weil die Azubis viel Mist bauten.
28	Um die Azubis herauszufordern, war Petra kritisch.
28	Weil die Azubis viel Mist bauten, war Petra kritisch.
29	Verena war liberal, um den Studenten viel Freiheit einzuräumen.
29	Verena war liberal, weil den Studenten ihre Freiheit wichtig war.
29	Um den Studenten viel Freiheit einzuräumen, war Verena liberal.
29	Weil den Studenten ihre Freiheit wichtig war, war Verena liberal.
30	Adam war liebevoll, um die Kinder zu beruhigen.
30	Adam war liebevoll, weil die Kinder ihn entzückten.
30	Um die Kinder zu beruhigen, war Adam liebevoll.
30	Weil die Kinder ihn entzückten, war Adam liebevoll.
31	Alex war lustig, um die Clowns von sich zu überzeugen.
31	Alex war lustig, weil die Clowns ihm viel beigebracht hatten.
31	Um die Clowns von sich zu überzeugen, war Alex lustig.
31	Weil die Clowns ihm viel beigebracht hatten, war Alex lustig.
32	Armin war männlich, um die Freundin zu beeindrucken.
32	Armin war männlich, weil die Freundin das attraktiv fand.
32	Um die Freundin zu beeindrucken, war Armin männlich.
32	Weil die Freundin das attraktiv fand, war Armin männlich.

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Table E.1 – *Continued from previous page*

NR	Sentence
33	Daniel war nachlässig, um die Arbeit auf andere abzuwälzen.
33	Daniel war nachlässig, weil die Arbeit ihn sehr langweilte.
33	Um die Arbeit auf andere abzuwälzen, war Daniel nachlässig.
33	Weil die Arbeit ihn sehr langweilte, war Daniel nachlässig.
34	Dennis war natürlich, um seine Persönlichkeit zu zeigen.
34	Dennis war natürlich, weil seine Persönlichkeit beliebt war.
34	Um seine Persönlichkeit zu zeigen, war Dennis natürlich.
34	Weil seine Persönlichkeit beliebt war, war Dennis natürlich.
35	Janina war nervös, um der Jury Angst vorzuspielen.
35	Janina war nervös, weil der Jury ihr Alibi suspekt war.
35	Um der Jury Angst vorzuspielen, war Janina nervös.
35	Weil der Jury ihr Alibi suspekt war, war Janina nervös.
36	Fritz war neugierig, um das Geheimnis zu enthüllen.
36	Fritz war neugierig, weil das Geheimnis ihn faszinierte.
36	Um das Geheimnis zu enthüllen, war Fritz neugierig.
36	Weil das Geheimnis ihn faszinierte, war Fritz neugierig.
37	Heiko war passiv, um seine Frau nicht aufzubringen.
37	Heiko war passiv, weil seine Frau die Pflichten übernahm.
37	Um seine Frau nicht aufzubringen, war Heiko passiv.
37	Weil seine Frau die Pflichten übernahm, war Heiko passiv.
38	Holger war pragmatisch, um seine Ziele schneller zu erreichen.
38	Holger war pragmatisch, weil seine Ziele angemessen gesetzt waren.
38	Um seine Ziele schneller zu erreichen, war Holger pragmatisch.
38	Weil seine Ziele angemessen gesetzt waren, war Holger pragmatisch.
39	Jakob war reserviert, um seine Gefühle besser zu verbergen.
39	Jakob war reserviert, weil seine Gefühle ihn verlassen hatten.
39	Um seine Gefühle besser zu verbergen, war Jakob reserviert.
39	Weil seine Gefühle ihn verlassen hatten, war Jakob reserviert.
40	Thomas war ritterlich, um seine Treue der Gräfin zu zeigen.
40	Thomas war ritterlich, weil seine Treue so grenzenlos war.
40	Um seine Treue der Gräfin zu zeigen, war Thomas ritterlich.
40	Weil seine Treue so grenzenlos war, war Thomas ritterlich.
41	Jannik war selbstlos, um die Kameraden für sich zu gewinnen.
41	Jannik war selbstlos, weil die Kameraden alle zusammenhielten.
41	Um die Kameraden für sich zu gewinnen, war Jannik selbstlos.
41	Weil die Kameraden alle zusammenhielten, war Jannik selbstlos.
42	Jonas war sexistisch, um die Frau einzuschüchtern.
42	Jonas war sexistisch, weil die Frau ihn einschüchterte.
42	Um die Frau einzuschüchtern, war Jonas sexistisch.
42	Weil die Frau ihn einschüchterte, war Jonas sexistisch.
43	Karl war skeptisch, um die Theorie in Frage zu stellen.
43	Karl war skeptisch, weil die Theorie einige Lücken aufwies.
43	Um die Theorie in Frage zu stellen, war Karl skeptisch.
43	Weil die Theorie einige Lücken aufwies, war Karl skeptisch.
44	Kilian war skrupellos, um die Konkurrenz konsequent auszuschalten.
44	Kilian war skrupellos, weil die Konkurrenz aus Verbrechern bestand.
44	Um die Konkurrenz konsequent auszuschalten, war Kilian skrupellos.
44	Weil die Konkurrenz aus Verbrechern bestand, war Kilian skrupellos.
45	Klaus war taktvoll, um Rücksicht auf andere zu nehmen.
45	Klaus war taktvoll, weil Rücksicht seine Stärke war.
45	Um Rücksicht auf andere zu nehmen, war Klaus taktvoll.

Continued on next page

Table E.1 – *Continued from previous page*

NR	Sentence
45	Weil Rücksicht seine Stärke war, war Klaus taktvoll.
46	Lorenz war todernst, um die Geschäftslage klar darzustellen.
46	Lorenz war todernst, weil die Geschäftslage sich verschlechterte.
46	Um die Geschäftslage klar darzustellen, war Lorenz todernst.
46	Weil die Geschäftslage sich verschlechterte, war Lorenz todernst.
47	Nils war tolerant, um den Touristen eine weitere Chance zu geben.
47	Nils war tolerant, weil den Touristen die Gebräuche unbekannt waren.
47	Um den Touristen eine weitere Chance zu geben, war Nils tolerant.
47	Weil den Touristen die Gebräuche unbekannt waren, war Nils tolerant.
48	Lukas war überrascht, um seine Freunde nicht zu enttäuschen.
48	Lukas war überrascht, weil seine Freunde seine Frau kannten.
48	Um seine Freunde nicht zu enttäuschen, war Lukas überrascht.
48	Weil seine Freunde seine Frau kannten, war Lukas überrascht.
49	Manuel war unruhig, um die Verdächtigen hinters Licht zu führen.
49	Manuel war unruhig, weil die Verdächtigen viele Waffen hatten.
49	Um die Verdächtigen hinters Licht zu führen, war Manuel unruhig.
49	Weil die Verdächtigen viele Waffen hatten, war Manuel unruhig.
50	Marc war unschuldig, um die Agenten in Sicherheit zu wiegen.
50	Marc war unschuldig, weil die Agenten die Tat begangen hatten.
50	Um die Agenten in Sicherheit zu wiegen, war Marc unschuldig.
50	Weil die Agenten die Tat begangen hatten, war Marc unschuldig.
51	Martin war verärgert, um seine Unzufriedenheit zu zeigen.
51	Martin war verärgert, weil seine Unzufriedenheit gewachsen war.
51	Um seine Unzufriedenheit zu zeigen, war Martin verärgert.
51	Weil seine Unzufriedenheit gewachsen war, war Martin verärgert.
52	Ludwig war verrückt, um die Ärzte zu erschrecken.
52	Ludwig war verrückt, weil die Ärzte ihn erschreckten.
52	Um die Ärzte zu erschrecken, war Ludwig verrückt.
52	Weil die Ärzte ihn erschreckten, war Ludwig verrückt.
53	Oliver war vorsichtig, um die Fallen zu vermeiden.
53	Oliver war vorsichtig, weil die Fallen ihm Angst machten.
53	Um die Fallen zu vermeiden, war Oliver vorsichtig.
53	Weil die Fallen ihm Angst machten, war Oliver vorsichtig.
54	Pascal war wahnsinnig, um die Medikamente zu bekommen.
54	Pascal war wahnsinnig, weil die Medikamente nicht anschlugen.
54	Um die Medikamente zu bekommen, war Pascal wahnsinnig.
54	Weil die Medikamente nicht anschlugen, war Pascal wahnsinnig.
55	Sonja war weiblich, um ihre Figur zu betonen.
55	Sonja war weiblich, weil ihre Figur üppig war.
55	Um ihre Figur zu betonen, war Sonja weiblich.
55	Weil ihre Figur üppig war, war Sonja weiblich.
56	Tobias war wohlwollend, um die Lehrlinge besser zu betreuen.
56	Tobias war wohlwollend, weil die Lehrlinge gute Arbeit leisteten.
56	Um die Lehrlinge besser zu betreuen, war Tobias wohlwollend.
56	Weil die Lehrlinge gute Arbeit leisteten, war Tobias wohlwollend.
57	Robin war zielbewusst, um das Studium schnell abzuschließen.
57	Robin war zielbewusst, weil das Studium ihn das gelehrt hatte.
57	Um das Studium schnell abzuschließen, war Robin zielbewusst.
57	Weil das Studium ihn das gelehrt hatte, war Robin zielbewusst.
58	Peter war zielstrebig, um die Ausbildung erfolgreich zu beenden.
58	Peter war zielstrebig, weil die Ausbildung ihn tief geprägt hatte.

Continued on next page

Table E.1 – *Continued from previous page*

NR	Sentence
58	Um die Ausbildung erfolgreich zu beenden, war Peter zielstrebig.
58	Weil die Ausbildung ihn tief geprägt hatte, war Peter zielstrebig.
59	Simon war zufrieden, um die Kunden von dem Deal zu überzeugen.
59	Simon war zufrieden, weil die Kunden reichlich seine Waren kauften.
59	Um die Kunden von dem Deal zu überzeugen, war Simon zufrieden.
59	Weil die Kunden reichlich seine Waren kauften, war Simon zufrieden.
60	Stefan war zynisch, um die Debatte aufzuheizen.
60	Stefan war zynisch, weil die Debatte ihn langweilte.
60	Um die Debatte aufzuheizen, war Stefan zynisch.
60	Weil die Debatte ihn langweilte, war Stefan zynisch.

F
Adjectives Used in Experiment 7

Table F.1: Adjectives used in Experiment 7. Standard deviation in brackets.

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
abweisend ‘repellent’	1–7	4.7 (1.8)	5.0 (2.3)	5.3 (1.3)	3.7 (1.3)
achtsam ‘mindful’	1–7	3.7 (1.9)	3.4 (1.4)	4.8 (2.0)	2.8 (1.9)
aggressiv ‘aggressive’	1–7	2.8 (1.9)	2.6 (1.4)	3.8 (2.0)	2.1 (2.0)
aktiv ‘active’	1–7	5.2 (2.1)	5.3 (2.5)	5.4 (2.2)	4.8 (1.9)
alt ‘old’	1–6	1.7 (1.2)	1.5 (0.7)	2.2 (1.8)	1.3 (0.7)
altmodisch ‘old-fashioned’	1–7	3.7 (1.8)	4.5 (1.8)	4.2 (1.5)	2.3 (1.2)
ambitioniert ‘ambitious’	1–7	2.9 (1.8)	2.5 (1.3)	3.8 (2.3)	2.5 (1.6)
androgyn ‘androgynous’	1–7	3.1 (2.1)	3.6 (2.0)	3.3 (2.4)	2.4 (1.9)
anerkannt ‘recognized’	1–5	1.8 (1.0)	1.6 (0.5)	1.9 (1.0)	2.0 (1.4)
ängstlich ‘timid’	1–5	1.9 (1.2)	2.5 (1.5)	1.8 (1.0)	1.5 (0.7)
anhänglich ‘clingy’	1–7	3.4 (1.9)	3.5 (1.8)	4.3 (2.1)	2.5 (1.4)
anlehnungsbedürftig ‘in need of affection’	1–7	2.0 (1.5)	2.3 (1.8)	2.1 (1.4)	1.6 (1.3)
anspruchslos ‘undemanding’	1–7	3.2 (2.0)	3.0 (1.6)	3.5 (1.8)	3.1 (2.6)
arbeitslos ‘unemployed’	1–7	3.7 (1.8)	3.6 (1.5)	3.6 (2.1)	3.9 (2.0)
arbeitsunfähig ‘unable to work’	1–6	1.8 (1.5)	1.7 (1.3)	2.7 (1.9)	1.1 (0.3)
ärgerlich ‘annoying’	1–7	2.5 (1.6)	2.1 (1.1)	3.1 (1.5)	2.4 (2.1)
arm ‘poor’	1–7	2.6 (1.8)	2.8 (1.9)	1.6 (0.7)	3.3 (2.1)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
artig 'well-behaved'	1–7	3.7 (1.8)	3.4 (2.1)	4.5 (2.0)	3.2 (1.2)
atemlos 'breathless'	1–6	1.8 (1.0)	1.7 (0.7)	1.8 (0.8)	2.0 (1.6)
atheistisch 'atheistic'	1–7	3.7 (2.4)	2.7 (1.9)	4.7 (2.3)	3.6 (2.6)
athletisch 'athletic'	1–7	3.4 (1.9)	2.7 (1.5)	4.4 (2.3)	3.0 (1.4)
attraktiv 'attractive'	1–5	1.9 (1.1)	1.6 (1.0)	2.2 (1.3)	1.8 (1.1)
aufgekratzt 'exhilarated'	1–7	2.3 (1.9)	2.3 (1.8)	2.7 (2.1)	2.0 (1.8)
aufgeregt 'excited'	1–6	2.0 (1.4)	2.1 (1.1)	2.4 (2.0)	1.6 (1.0)
aufgetakelt 'tarted up'	1–7	4.8 (1.5)	5.0 (1.6)	4.8 (1.6)	4.6 (1.5)
aufmerksam 'attentive'	1–7	4.1 (1.9)	4.0 (1.7)	4.5 (2.0)	3.9 (2.0)
ausgehungert 'starved'	1–7	2.5 (1.6)	2.7 (1.9)	1.7 (0.8)	3.0 (1.7)
ausgeschlafen 'alert'	1–7	3.2 (2.0)	2.6 (1.8)	4.6 (2.1)	2.3 (1.4)
außergewöhnlich 'extraordinary'	1–6	2.8 (1.7)	3.0 (1.9)	2.8 (1.7)	2.7 (1.7)
autistisch 'autistic'	1–6	1.5 (1.1)	1.5 (1.0)	1.3 (0.7)	1.8 (1.6)
barbarisch 'barbaric'	1–7	3.1 (1.8)	3.8 (2.3)	3.1 (1.7)	2.4 (1.1)
begabt 'gifted'	1–5	1.7 (1.0)	1.5 (0.7)	2.1 (1.4)	1.6 (0.7)
begeistert 'enthusiastic'	1–6	2.5 (1.4)	3.0 (1.7)	2.1 (0.9)	2.4 (1.5)
beherrscht 'controlled'	1–7	3.5 (2.0)	3.9 (2.1)	3.8 (2.3)	2.7 (1.7)
behindert 'disabled'	1–2	1.2 (0.4)	1.1 (0.3)	1.2 (0.4)	1.2 (0.4)
bekannt 'known'	1–7	2.4 (1.5)	2.6 (1.5)	2.0 (1.2)	2.6 (1.8)
beliebt 'popular'	1–7	2.6 (1.9)	1.9 (1.0)	3.1 (2.3)	2.7 (2.0)
benebelt 'dazed'	1–6	2.4 (1.4)	2.6 (1.8)	2.2 (1.2)	2.4 (1.2)
bereit 'ready'	1–7	2.8 (1.8)	3.0 (2.1)	2.5 (1.4)	2.9 (2.0)
berufstätig 'employed'	1–7	3.5 (2.0)	3.1 (2.1)	3.1 (1.4)	4.4 (2.3)
berühmt 'famous'	1–6	2.3 (1.4)	2.0 (0.9)	2.1 (1.4)	2.9 (1.7)
bescheiden 'modest'	1–7	4.1 (1.8)	4.3 (1.4)	4.8 (1.9)	3.1 (1.7)
besoffen 'drunk'	1–7	3.9 (1.6)	3.5 (1.2)	3.6 (1.7)	4.6 (1.8)
besorgt 'concerned'	1–7	2.5 (1.7)	2.7 (1.4)	3.2 (2.3)	1.5 (0.7)
betäubt 'stunned'	1–6	2.0 (1.6)	1.8 (1.2)	1.4 (0.8)	2.8 (2.1)
betrunken 'drunk'	1–7	4.2 (1.7)	4.7 (1.8)	3.8 (1.4)	4.1 (1.9)
bewusstlos 'unconscious'	1–5	1.4 (0.9)	1.5 (0.8)	1.5 (1.3)	1.1 (0.3)
bissig 'snappy'	1–7	3.1 (2.0)	3.1 (2.1)	4.0 (2.3)	2.3 (1.2)
bitter 'bitter'	1–5	2.0 (1.2)	2.1 (1.2)	2.4 (1.3)	1.6 (1.1)
bleich 'pale'	1–7	2.0 (1.6)	1.6 (0.8)	2.5 (1.9)	1.8 (1.9)
blind 'blind'	1–7	1.7 (1.5)	2.0 (1.9)	2.0 (1.7)	1.0 (0.0)
blond 'blond'	1–7	3.6 (2.2)	2.9 (1.9)	4.1 (2.5)	3.9 (2.3)
böse 'angry'	1–7	4.2 (2.2)	5.6 (1.9)	4.0 (1.9)	2.9 (2.1)
braunäugig 'brown-eyed'	1–6	1.4 (1.1)	1.8 (1.8)	1.2 (0.4)	1.2 (0.6)
braungebrannt 'tanned'	1–7	4.3 (2.1)	4.1 (1.8)	4.5 (2.3)	4.4 (2.3)
brav 'well-behaved'	1–7	3.8 (1.8)	5.2 (1.5)	3.7 (1.3)	2.4 (1.2)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
chaotisch 'chaotic'	1–6	2.9 (1.4)	2.8 (1.2)	2.5 (1.2)	3.3 (1.6)
charmant 'charming'	1–7	4.1 (2.2)	4.3 (2.3)	5.7 (1.8)	2.4 (1.1)
cholerisch 'choleric'	1–7	2.3 (1.5)	2.0 (0.9)	2.7 (1.6)	2.2 (1.9)
cool 'cool'	1–7	3.9 (1.9)	4.7 (1.5)	4.7 (1.8)	2.3 (1.2)
defensiv 'defensive'	1–7	3.8 (1.7)	3.9 (1.7)	4.2 (1.9)	3.4 (1.6)
dehydriert 'dehydrated'	1–7	1.9 (1.3)	2.1 (2.0)	1.9 (0.7)	1.7 (0.9)
deutsch 'German'	1–7	1.9 (1.6)	1.6 (1.0)	2.3 (1.9)	1.9 (1.9)
dick 'thick'	1–7	2.8 (1.5)	3.3 (1.6)	2.8 (1.5)	2.3 (1.2)
dienstbereit 'ready for work'	1–7	3.2 (1.9)	2.3 (1.6)	2.8 (1.5)	4.5 (1.9)
dienstunfähig 'unfit for work'	1–7	2.8 (2.0)	3.3 (2.5)	3.3 (1.9)	1.7 (0.9)
diplomatisch 'diplomatic'	1–7	3.8 (2.1)	3.5 (2.3)	5.6 (1.0)	2.4 (1.4)
diplomiert 'qualified'	1–7	2.2 (1.7)	2.1 (1.6)	2.0 (1.8)	2.4 (1.8)
diszipliniert 'disciplined'	1–7	4.2 (1.7)	3.9 (1.7)	3.9 (1.4)	4.9 (1.9)
drogenabhängig 'addicted to drugs'	1–6	1.9 (1.3)	1.4 (0.5)	2.2 (1.0)	2.2 (1.9)
drogensüchtig 'addicted to drugs'	1–7	2.2 (1.5)	2.4 (1.8)	2.7 (1.7)	1.5 (0.5)
dumm 'stupid'	1–7	2.3 (1.5)	2.5 (1.6)	2.4 (1.8)	1.9 (1.3)
dümmlich 'simple-minded'	1–7	3.0 (1.7)	3.2 (1.8)	3.9 (1.9)	1.9 (0.9)
dunkelhäutig 'dark-skinned'	1–7	1.5 (1.3)	1.4 (0.7)	2.1 (2.0)	1.1 (0.3)
dünn 'thin'	1–7	3.9 (1.9)	4.1 (2.0)	3.8 (2.1)	3.7 (1.8)
durstig 'thirsty'	1–7	1.8 (1.3)	1.8 (1.9)	2.0 (0.8)	1.6 (1.1)
ehrlich 'honest'	1–7	4.0 (2.2)	2.4 (1.7)	5.0 (1.8)	4.6 (2.4)
eifersüchtig 'jealous'	1–7	2.4 (1.5)	2.3 (0.9)	3.1 (2.1)	1.7 (0.9)
eigenwillig 'headstrong'	1–7	2.7 (1.6)	2.5 (1.4)	3.7 (1.8)	1.9 (1.0)
einarmig 'one-armed'	1–6	1.6 (1.4)	1.7 (1.6)	1.1 (0.3)	2.1 (1.6)
einsam 'lonely'	1–7	2.9 (1.9)	2.9 (1.9)	3.5 (2.2)	2.2 (1.4)
elegant 'elegant'	1–7	3.9 (1.8)	4.5 (1.9)	4.9 (1.4)	2.4 (1.1)
emeritiert 'retired'	1–7	3.0 (1.8)	3.4 (1.9)	2.3 (1.9)	3.3 (1.5)
empfindlich 'sensitive'	1–5	2.4 (1.3)	2.3 (1.2)	2.9 (1.6)	1.9 (1.0)
empört 'outraged'	1–7	2.5 (1.6)	3.1 (1.9)	2.8 (1.4)	1.7 (1.1)
energisch 'energetic'	1–6	3.5 (1.7)	3.5 (1.3)	3.4 (1.8)	3.6 (2.1)
engagiert 'involved'	1–7	4.2 (2.2)	3.4 (1.8)	5.2 (2.1)	4.1 (2.5)
enthusiastisch 'enthusiastic'	1–7	3.5 (1.8)	4.2 (1.9)	3.6 (1.8)	2.8 (1.3)
entsetzt 'horrified'	1–7	2.3 (1.5)	2.5 (1.5)	2.3 (1.3)	2.1 (1.9)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
enttäuscht 'disappointed'	1–4	1.9 (0.9)	1.9 (0.7)	2.3 (1.2)	1.6 (0.5)
entzückend 'delightful'	1–7	2.3 (1.4)	2.8 (1.3)	2.6 (1.6)	1.6 (1.0)
erfahren 'experienced'	1–7	2.1 (1.5)	2.3 (1.6)	2.3 (1.8)	1.7 (1.1)
erfolgreich 'successful'	1–7	2.7 (1.6)	3.4 (1.9)	2.4 (1.3)	2.4 (1.5)
erleichtert 'relieved'	1–7	2.3 (1.7)	2.5 (2.2)	2.7 (1.8)	1.6 (0.8)
ernst 'serious'	1–7	4.1 (1.6)	5.0 (1.3)	3.7 (1.5)	3.7 (1.6)
erregt 'excited'	1–7	2.8 (1.9)	3.0 (2.1)	3.6 (2.3)	1.8 (0.8)
errötet 'flushed'	1–7	1.8 (1.4)	2.5 (2.0)	1.5 (0.7)	1.3 (0.7)
erschöpft 'exhausted'	1–7	2.4 (1.6)	2.2 (1.8)	2.6 (1.7)	2.3 (1.4)
erstaunt 'amazed'	1–7	2.1 (1.6)	2.5 (1.4)	2.7 (2.3)	1.2 (0.4)
erwachsen 'grown up'	1–7	2.3 (2.0)	1.8 (1.2)	3.3 (2.6)	1.9 (1.6)
ethisch 'ethical'	1–6	2.6 (1.6)	2.2 (1.6)	3.2 (1.9)	2.5 (1.4)
evangelisch 'evangelical'	1–7	3.9 (2.0)	2.2 (1.5)	4.1 (1.6)	5.4 (1.6)
extravertiert 'extroverted'	1–7	2.4 (1.5)	2.9 (1.9)	2.4 (1.6)	1.9 (1.0)
fachkompetent 'competent'	1–7	2.5 (1.5)	2.2 (1.9)	3.1 (1.2)	2.1 (1.1)
fair 'fair'	1–7	3.8 (1.9)	3.9 (1.5)	4.6 (2.0)	2.8 (1.8)
fantasielos 'unimaginative'	1–7	2.1 (1.6)	2.9 (1.6)	1.8 (1.9)	1.6 (0.8)
fassungslos 'stunned'	1–7	2.3 (1.6)	1.7 (1.1)	3.0 (2.0)	2.1 (1.5)
faul 'lazy'	1–7	4.2 (1.9)	4.9 (1.1)	4.8 (2.1)	3.0 (1.9)
feminin 'feminine'	1–7	3.2 (2.2)	2.7 (1.7)	5.6 (1.3)	1.3 (0.5)
fett 'fat'	1–7	2.9 (1.7)	3.1 (2.0)	2.6 (1.2)	3.1 (2.0)
fit 'fit'	1–7	3.7 (2.0)	2.7 (1.8)	5.3 (1.8)	3.2 (1.8)
fleißig 'diligent'	1–7	4.4 (1.9)	5.3 (1.7)	4.3 (1.8)	3.7 (1.8)
flexibel 'flexible'	1–7	2.9 (2.0)	1.9 (1.2)	4.1 (2.1)	2.8 (2.2)
folgsam 'obedient'	1–7	3.7 (1.9)	3.6 (2.2)	4.3 (1.6)	3.3 (1.8)
frech 'cheeky'	1–7	4.9 (1.8)	5.7 (0.8)	5.2 (1.8)	3.8 (2.1)
freigebig 'generous'	1–6	3.5 (1.5)	3.0 (1.7)	3.4 (1.2)	4.0 (1.6)
freundlich 'friendly'	1–7	5.1 (1.9)	4.7 (2.2)	6.7 (0.5)	4.0 (1.6)
friedliebend 'peace loving'	1–7	3.4 (2.1)	3.3 (2.2)	4.1 (2.2)	2.7 (1.9)
fröhlich 'happy'	1–7	3.5 (1.6)	4.1 (1.9)	3.9 (1.6)	2.5 (1.0)
fromm 'religious'	1–7	3.3 (1.7)	2.4 (1.2)	3.5 (1.8)	4.0 (1.8)
füllig 'plump'	1–7	2.6 (1.8)	2.3 (1.8)	3.0 (2.2)	2.4 (1.6)
furchtlos 'fearless'	1–7	2.7 (1.6)	3.3 (1.7)	2.5 (1.2)	2.3 (1.8)
fürsorglich 'caring'	1–7	3.7 (2.0)	3.5 (2.0)	3.6 (2.0)	3.9 (2.2)
gebildet 'educated'	1–5	2.3 (1.3)	2.0 (0.8)	2.8 (1.4)	2.1 (1.4)
geduldig 'patient'	1–7	3.8 (1.9)	3.3 (1.6)	5.4 (1.6)	2.6 (1.3)
gefährlich 'dangerous'	1–7	2.6 (1.6)	2.6 (1.6)	3.1 (2.0)	2.1 (0.9)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
gehorsam 'obedient'	1–7	3.5 (2.0)	4.3 (2.0)	3.5 (1.7)	2.7 (2.0)
geimpft 'vaccinated'	1–7	4.4 (2.2)	4.5 (2.1)	2.7 (1.9)	6.1 (1.1)
geizig 'stingy'	1–7	3.2 (2.0)	3.1 (1.7)	4.3 (2.3)	2.3 (1.6)
gerissen 'cunning'	1–6	2.3 (1.6)	2.2 (1.8)	3.2 (1.8)	1.6 (0.8)
geschäftig 'busy'	1–7	3.5 (1.5)	3.6 (1.4)	3.8 (1.7)	3.0 (1.2)
geschminkt 'made up'	1–7	4.7 (1.8)	5.0 (1.8)	5.3 (1.8)	3.7 (1.5)
gesund 'healthy'	1–7	2.3 (1.5)	2.2 (1.6)	2.9 (1.9)	1.9 (0.9)
getauft 'baptized'	1–7	3.6 (2.2)	3.3 (2.1)	3.3 (2.3)	4.3 (2.5)
gewaltig 'powerful'	1–6	2.1 (1.4)	3.1 (1.8)	1.5 (0.7)	1.6 (0.7)
gierig 'greedy'	1–7	2.6 (2.0)	3.1 (2.2)	2.6 (2.2)	2.2 (1.5)
gläubig 'believing'	1–7	3.5 (1.9)	2.8 (1.8)	3.6 (1.6)	4.2 (2.0)
gleichgültig 'indifferent'	1–7	3.1 (2.0)	3.1 (2.1)	4.3 (2.1)	2.0 (0.9)
glücklich 'happy'	1–6	2.9 (1.5)	2.9 (1.5)	3.6 (1.5)	2.1 (1.1)
grauenhaft 'terrible'	1–7	3.2 (1.8)	3.2 (1.5)	3.8 (2.3)	2.5 (1.5)
groß 'large'	1–7	2.2 (2.0)	2.2 (2.0)	3.0 (2.6)	1.3 (0.7)
gutgläubig 'trusting'	1–5	2.2 (1.4)	1.9 (1.2)	2.4 (1.5)	2.3 (1.6)
gutherzig 'kind-hearted'	1–7	3.1 (1.8)	2.6 (1.3)	4.2 (2.3)	2.6 (1.2)
halberfolgreich 'semi-successful'	1–7	2.3 (1.6)	1.8 (1.1)	3.0 (2.1)	2.0 (1.5)
hartherzig 'hard-hearted'	1–7	3.7 (2.0)	4.4 (2.2)	3.9 (2.0)	2.9 (1.6)
hartnäckig 'persistent'	1–7	4.2 (2.0)	4.6 (1.8)	5.7 (1.2)	2.2 (1.4)
hässlich 'ugly'	1–5	1.8 (1.1)	1.9 (1.3)	1.9 (1.1)	1.6 (0.8)
hellwach 'wide awake'	1–7	2.7 (1.7)	2.5 (1.3)	3.0 (2.0)	2.5 (1.8)
hemmungslos 'uninhibited'	1–7	3.4 (2.0)	4.7 (2.0)	3.6 (1.7)	1.9 (1.1)
herzlich 'warm'	1–7	3.9 (1.9)	4.0 (2.4)	4.5 (1.6)	3.1 (1.5)
herzlos 'heartless'	1–7	3.3 (1.6)	3.3 (1.7)	3.8 (0.9)	2.8 (1.9)
heterosexuell 'heterosexual'	1–7	2.5 (2.1)	1.7 (1.3)	3.0 (2.2)	2.7 (2.5)
hochbegabt 'highly gifted'	1–6	1.8 (1.3)	1.9 (1.2)	1.6 (1.3)	1.9 (1.6)
hoffnungslos 'hopeless'	1–6	2.2 (1.5)	3.0 (2.0)	1.9 (1.0)	1.7 (1.1)
höflich 'polite'	1–7	4.8 (1.9)	6.0 (1.8)	4.6 (1.8)	3.8 (1.5)
homosexuell 'homosexual'	1–7	2.1 (1.7)	1.4 (0.7)	1.8 (1.0)	3.2 (2.4)
hübsch 'pretty'	1–5	2.0 (1.2)	1.7 (0.9)	2.0 (1.1)	2.4 (1.5)
humorvoll 'humorous'	1–7	3.1 (1.9)	3.2 (1.3)	4.3 (2.1)	1.9 (1.3)
hungrig 'hungry'	1–6	2.3 (1.6)	2.0 (1.6)	2.6 (1.8)	2.2 (1.3)
idealistisch 'idealistic'	1–7	3.3 (1.7)	2.8 (1.5)	4.1 (2.1)	3.0 (1.2)
ignorant 'ignorant'	1–7	3.7 (2.0)	4.1 (2.2)	4.7 (1.9)	2.2 (0.9)
impulsiv 'impulsive'	1–7	2.7 (1.8)	2.6 (1.6)	3.0 (2.2)	2.4 (1.6)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
inkompetent 'incompetent'	1–6	2.3 (1.3)	2.9 (1.7)	2.2 (0.9)	1.8 (1.0)
inkonsequent 'inconsistent'	1–7	3.9 (1.9)	3.8 (1.9)	4.3 (2.0)	3.6 (1.8)
intellektuell 'intellectual'	1–5	2.1 (1.4)	1.6 (0.7)	3.2 (1.8)	1.6 (1.0)
intelligent 'intelligent'	1–7	1.8 (1.3)	1.5 (0.7)	2.6 (2.0)	1.4 (0.5)
introvertiert 'introverted'	1–7	2.4 (1.4)	2.0 (0.8)	2.9 (1.3)	2.4 (1.8)
ironisch 'ironic'	1–7	4.7 (2.2)	6.7 (0.7)	5.1 (1.4)	2.4 (1.5)
italienisch 'Italian'	1–7	1.6 (1.3)	1.2 (0.4)	2.0 (1.1)	1.7 (1.9)
jugendlich 'youthful'	1–5	2.0 (1.2)	2.6 (1.6)	2.0 (0.8)	1.5 (0.7)
jung 'young'	1–3	1.3 (0.6)	1.2 (0.4)	1.2 (0.4)	1.6 (0.7)
jungfräulich 'virgin'	1–7	4.1 (1.9)	4.7 (2.1)	4.0 (1.7)	3.6 (2.0)
kalt 'cold'	1–7	2.9 (2.0)	2.8 (2.2)	3.9 (2.2)	2.1 (1.3)
katholisch 'Catholic'	1–7	3.9 (2.1)	3.0 (1.9)	3.5 (1.8)	5.2 (1.9)
kinderlieb 'fond of children'	1–7	2.4 (1.8)	2.1 (1.1)	2.6 (1.8)	2.5 (2.3)
kindisch 'childish'	1–7	3.7 (2.1)	4.3 (1.5)	4.8 (2.5)	2.1 (1.1)
kindlich 'childlike'	1–7	3.3 (1.8)	4.1 (2.0)	3.8 (1.6)	2.1 (1.2)
klein 'small'	1–5	1.6 (1.1)	1.5 (1.3)	1.7 (1.1)	1.5 (1.0)
kleinlich 'petty'	1–7	3.8 (2.0)	4.6 (1.8)	3.5 (2.2)	3.3 (1.8)
klug 'smart'	1–7	2.1 (1.7)	2.4 (1.4)	2.0 (1.8)	1.9 (1.9)
komatös 'comatose'	1–4	1.3 (0.6)	1.5 (1.0)	1.1 (0.3)	1.2 (0.4)
konfirmiert 'confirmed'	1–7	3.9 (2.0)	3.8 (1.7)	3.3 (2.4)	4.6 (1.8)
konfliktscheu 'conflict-averse'	1–7	2.9 (1.6)	3.2 (1.8)	3.2 (1.5)	2.4 (1.3)
konzentriert 'concentrated'	1–7	4.0 (2.1)	4.0 (2.2)	4.2 (1.5)	3.9 (2.6)
kräftig 'strong'	1–7	2.9 (2.0)	2.7 (2.2)	3.5 (2.0)	2.5 (1.7)
krank 'ill'	1–7	2.4 (1.8)	3.6 (2.4)	2.1 (1.2)	1.6 (0.7)
kritisch 'critical'	1–7	4.2 (1.8)	4.5 (1.7)	5.2 (1.6)	2.8 (1.1)
lang 'long'	1–2	1.3 (0.4)	1.3 (0.5)	1.0 (0.0)	1.5 (0.5)
langweilig 'boring'	1–7	2.5 (1.7)	2.3 (1.2)	3.1 (1.8)	2.1 (2.0)
laut 'loud'	1–7	5.2 (1.9)	5.8 (1.6)	5.3 (1.9)	4.4 (2.0)
lebendig 'alive'	1–7	2.2 (1.7)	1.5 (0.8)	3.0 (1.9)	2.2 (1.9)
leichtsinnig 'reckless'	1–7	4.0 (1.8)	4.1 (1.9)	4.4 (1.9)	3.6 (1.8)
leidenschaftlich 'passionate'	1–7	3.4 (1.6)	3.6 (1.9)	4.0 (1.3)	2.6 (1.5)
leise 'quiet'	1–7	5.3 (1.8)	5.1 (1.7)	5.8 (1.3)	4.9 (2.3)
leistungsfähig 'efficient'	1–6	2.4 (1.5)	2.3 (1.4)	3.1 (1.4)	1.8 (1.5)
leseschwach 'poor of reading'	1–2	1.2 (0.4)	1.3 (0.5)	1.3 (0.5)	1.1 (0.3)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
liberal 'liberal'	1–7	3.8 (1.6)	3.7 (1.7)	4.7 (1.6)	3.1 (1.1)
liebevoll 'loving'	1–7	3.9 (1.7)	4.3 (2.2)	4.5 (1.0)	3.0 (1.6)
loyal 'loyal'	1–7	3.6 (1.7)	4.1 (1.8)	4.3 (1.6)	2.5 (1.2)
lustig 'funny'	1–7	3.8 (1.9)	4.0 (1.9)	4.8 (1.8)	2.5 (1.4)
mager 'skinny'	1–7	3.8 (1.7)	4.1 (1.4)	3.5 (2.2)	3.9 (1.4)
magersüchtig 'anorexic'	1–5	1.9 (1.3)	2.3 (1.4)	1.6 (1.1)	1.9 (1.3)
männlich 'male'	1–6	2.2 (1.6)	2.4 (1.8)	3.0 (1.8)	1.3 (0.7)
menschenscheu 'afraid of people'	1–7	2.5 (1.8)	1.7 (0.7)	3.5 (2.2)	2.2 (1.9)
merkwürdig 'strange'	1–7	2.9 (1.8)	3.2 (2.3)	3.8 (1.6)	1.7 (0.7)
minderjährig 'underage'	1–4	1.3 (0.7)	1.2 (0.4)	1.4 (0.7)	1.4 (1.0)
misstrauisch 'suspicious'	1–7	3.1 (1.6)	3.4 (1.5)	3.6 (1.8)	2.4 (1.3)
modern 'modern'	1–7	3.1 (1.7)	2.2 (1.2)	4.3 (1.7)	2.8 (1.5)
modisch 'stylish'	1–7	3.4 (2.0)	3.1 (1.7)	5.1 (2.1)	2.1 (0.9)
müde 'tired'	1–5	1.9 (1.0)	2.5 (1.2)	1.5 (0.5)	1.6 (1.0)
munter 'bright'	1–7	2.8 (1.8)	3.6 (2.1)	2.8 (1.8)	2.0 (0.9)
musikalisch 'musical'	1–7	2.5 (1.8)	1.9 (1.4)	3.0 (1.8)	2.6 (2.1)
muskulös 'muscular'	1–7	3.1 (1.9)	2.3 (1.9)	4.2 (1.8)	2.9 (1.5)
mutig 'brave'	1–7	3.4 (1.9)	2.6 (1.9)	4.5 (2.0)	3.0 (1.2)
nachdenklich 'thoughtful'	1–7	2.8 (1.7)	3.2 (1.5)	2.8 (2.0)	2.3 (1.7)
nachlässig 'careless'	1–7	3.6 (1.7)	4.2 (1.8)	3.8 (1.9)	2.8 (1.2)
nackt 'naked'	2–7	5.1 (1.7)	5.3 (1.7)	4.7 (1.9)	5.2 (1.5)
naiv 'naive'	1–7	2.4 (1.4)	3.0 (1.9)	2.2 (1.1)	2.1 (1.0)
natürlich 'natural'	1–7	3.1 (1.7)	3.2 (1.6)	3.6 (1.6)	2.5 (1.8)
neidisch 'envious'	1–7	2.3 (1.7)	2.1 (1.1)	2.9 (2.3)	1.9 (1.5)
nervös 'nervous'	1–4	1.9 (0.8)	1.7 (0.8)	2.1 (0.7)	2.0 (0.9)
nett 'kind'	1–7	4.3 (2.1)	5.0 (2.2)	5.3 (1.7)	2.7 (1.6)
neu 'new'	1–7	1.7 (1.4)	2.1 (2.0)	1.2 (0.4)	1.7 (1.3)
neugierig 'curious'	1–7	3.1 (2.0)	3.8 (2.2)	3.7 (1.9)	1.9 (1.2)
niederländisch 'Dutch'	1–7	1.9 (1.7)	1.9 (1.7)	2.0 (1.8)	1.7 (1.6)
nüchtern 'sober'	1–7	4.8 (1.7)	5.8 (0.8)	4.0 (2.0)	4.5 (1.6)
ohnmächtig 'unconscious'	1–4	1.4 (0.9)	1.2 (0.6)	1.6 (1.3)	1.5 (0.5)
optimistisch 'optimistic'	1–7	3.4 (1.9)	2.4 (1.0)	5.4 (1.6)	2.5 (1.3)
organisiert 'organized'	1–7	3.5 (1.8)	3.4 (2.1)	4.2 (1.8)	2.9 (1.3)
parteilos 'impartial'	1–7	4.8 (2.0)	4.4 (1.9)	4.7 (2.1)	5.2 (2.1)
passiv 'passive'	1–7	3.7 (2.2)	2.7 (1.8)	4.2 (2.3)	4.3 (2.1)
peinlich 'embarrassing'	1–7	3.2 (2.0)	3.2 (2.4)	4.0 (1.9)	2.3 (1.6)
pensioniert 'retired'	1–6	2.7 (1.6)	2.4 (1.4)	2.0 (1.6)	3.6 (1.3)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
pervers 'perverse'	1–7	3.3 (1.9)	3.7 (2.0)	3.5 (1.8)	2.8 (1.8)
pessimistisch 'pessimistic'	1–7	2.9 (1.6)	2.6 (1.6)	3.1 (1.2)	2.9 (1.9)
pingelig 'picky'	1–7	3.5 (2.0)	4.2 (2.1)	4.3 (1.9)	2.0 (0.9)
platt 'dull'	1–4	1.8 (0.9)	2.0 (1.1)	1.8 (0.8)	1.5 (0.7)
pragmatisch 'pragmatic'	2–7	3.6 (1.5)	3.2 (1.1)	4.2 (1.9)	3.3 (1.3)
professionell 'professional'	1–7	3.5 (1.9)	3.3 (1.9)	4.3 (1.9)	2.9 (1.5)
promoviert 'with a PhD'	1–7	2.8 (1.7)	2.8 (1.9)	2.7 (1.3)	3.0 (1.9)
pünktlich 'punctual'	1–7	4.9 (1.9)	5.3 (1.4)	4.8 (2.0)	4.6 (2.2)
raffiniert 'refined'	1–7	2.8 (1.6)	2.6 (1.3)	3.6 (2.1)	2.1 (1.1)
realistisch 'realistic'	1–7	3.8 (1.9)	3.7 (1.6)	4.9 (1.9)	2.8 (1.6)
rechtsextrem 'extreme right'	1–7	2.9 (1.7)	3.0 (1.2)	3.1 (1.7)	2.6 (2.2)
reich 'rich'	1–7	2.1 (1.5)	1.8 (0.9)	2.5 (1.7)	2.1 (1.9)
reif 'mature'	1–5	2.2 (1.3)	2.6 (1.6)	2.1 (1.1)	1.8 (1.2)
reserviert 'reserved'	1–7	3.6 (1.9)	4.1 (1.7)	3.8 (2.3)	3.0 (1.5)
respektlos 'disrespectful'	1–7	3.8 (2.0)	4.5 (1.7)	5.2 (1.5)	1.8 (0.6)
ritterlich 'chivalrous'	1–7	3.0 (1.8)	3.4 (1.8)	4.0 (1.9)	1.7 (0.5)
rücksichtsvoll 'considerate'	1–6	4.3 (1.5)	4.4 (1.3)	4.8 (1.3)	3.7 (1.8)
ruhig 'calm'	1–7	4.3 (1.8)	5.3 (1.3)	4.2 (1.6)	3.5 (2.0)
rührig 'active'	1–4	1.8 (1.1)	1.9 (1.1)	1.6 (1.0)	2.0 (1.2)
rundlich 'plump'	1–6	2.6 (1.5)	2.0 (1.2)	3.6 (1.5)	2.2 (1.4)
sachlich 'factual'	1–7	4.3 (2.3)	3.6 (2.0)	5.9 (1.7)	3.3 (2.5)
sangeslustig 'taking pleasure in singing'	1–7	2.7 (1.7)	1.9 (1.3)	3.7 (1.8)	2.4 (1.4)
sarkastisch 'sarcastic'	1–7	4.6 (2.0)	5.8 (1.7)	5.2 (1.8)	2.7 (1.2)
satt 'fed (up)'	1–4	1.7 (0.9)	1.7 (1.1)	1.8 (1.0)	1.5 (0.7)
sauer 'mad'	1–7	2.9 (1.8)	3.0 (1.7)	3.9 (1.9)	1.8 (1.0)
schläfrig 'sleepy'	1–6	2.0 (1.1)	1.9 (0.7)	2.0 (1.2)	2.1 (1.4)
schlagfertig 'quick-witted'	1–7	3.6 (2.1)	3.4 (2.0)	5.2 (1.9)	2.2 (1.1)
schlank 'slim'	1–7	3.3 (2.0)	4.2 (2.0)	2.5 (1.7)	3.2 (2.0)
schlau 'smart'	1–6	2.0 (1.2)	2.1 (1.2)	2.1 (1.5)	1.8 (0.8)
schön 'beautiful'	1–6	2.4 (1.5)	2.3 (1.6)	2.9 (1.9)	1.9 (1.0)
schwanger 'pregnant'	1–7	4.2 (2.0)	4.6 (2.2)	3.6 (2.1)	4.5 (1.9)
schwerkrank 'seriously ill'	1–4	1.5 (0.8)	1.6 (0.8)	1.7 (0.9)	1.1 (0.3)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
schwermütig 'melancholic'	1–6	2.1 (1.3)	1.8 (0.8)	2.0 (0.9)	2.4 (2.0)
sehbehindert 'visually impaired'	1–4	1.2 (0.7)	1.1 (0.3)	1.2 (0.6)	1.4 (1.0)
selbstbewusst 'confident'	1–7	3.0 (1.7)	3.1 (1.7)	3.3 (2.0)	2.5 (1.5)
selbstlos 'selfless'	1–7	3.3 (1.8)	3.4 (1.8)	4.3 (1.8)	2.3 (1.2)
sexistisch 'sexist'	1–7	4.0 (1.8)	4.5 (1.8)	4.5 (1.4)	2.9 (1.9)
sexy 'sexy'	1–7	4.2 (1.8)	4.6 (1.8)	5.2 (1.5)	2.8 (1.2)
skeptisch 'skeptical'	1–7	2.9 (1.7)	2.8 (1.5)	3.4 (1.5)	2.4 (2.0)
skrupellos 'unscrupulous'	1–7	3.5 (2.1)	3.9 (2.0)	4.6 (1.9)	2.1 (1.8)
sorgenfrei 'carefree'	1–5	2.5 (1.4)	2.5 (1.5)	2.9 (1.4)	2.2 (1.2)
sorgfältig 'careful'	1–7	4.3 (2.0)	4.3 (1.9)	5.2 (1.9)	3.3 (1.8)
spanisch 'Spanish'	1–4	1.4 (0.8)	1.2 (0.4)	1.5 (1.0)	1.5 (0.8)
sparsam 'thrifty'	1–7	5.1 (1.8)	4.5 (2.3)	6.4 (0.5)	4.4 (1.6)
spendabel 'generous'	1–7	4.3 (1.8)	4.7 (2.1)	4.4 (1.4)	3.9 (1.9)
spontan 'spontaneous'	1–6	2.7 (1.3)	2.8 (1.7)	2.9 (1.3)	2.4 (0.7)
sportlich 'athletic'	1–7	3.1 (1.7)	2.2 (1.0)	3.8 (2.3)	3.4 (1.3)
sprachbehindert 'speech impaired'	1–4	1.3 (0.7)	1.5 (1.0)	1.3 (0.7)	1.2 (0.4)
sprachlos 'speechless'	1–4	1.7 (0.8)	1.7 (0.9)	2.0 (0.8)	1.5 (0.5)
stark 'strong'	1–7	3.6 (2.1)	3.8 (2.2)	4.6 (2.1)	2.3 (1.6)
steril 'sterile'	1–7	2.7 (2.0)	1.9 (1.1)	4.1 (2.2)	2.2 (1.8)
stolz 'proud'	1–7	2.6 (1.7)	2.2 (0.8)	3.4 (2.1)	2.3 (1.8)
strategisch 'strategic'	1–7	3.9 (1.9)	4.4 (1.8)	4.9 (1.9)	2.3 (0.9)
sympathisch 'likable'	1–6	2.7 (1.5)	3.1 (1.9)	2.5 (1.1)	2.5 (1.5)
taktvoll 'tactful'	1–7	3.7 (2.1)	2.9 (1.8)	5.6 (1.7)	2.7 (1.3)
talentiert 'talented'	1–7	1.8 (1.3)	1.4 (0.5)	1.7 (0.9)	2.2 (2.0)
tapfer 'courageous'	1–6	3.4 (1.8)	3.7 (1.4)	3.7 (2.1)	2.8 (1.9)
tätowiert 'tattooed'	1–7	4.1 (2.2)	3.4 (2.0)	4.5 (2.3)	4.5 (2.4)
temperamentvoll 'spirited'	1–6	2.8 (1.6)	3.2 (1.9)	3.1 (1.7)	2.0 (0.9)
teuflisch 'devilish'	1–6	3.1 (1.6)	3.0 (1.6)	3.3 (1.5)	3.1 (1.8)
todernst 'dead serious'	1–7	2.9 (1.9)	3.1 (2.0)	3.6 (2.2)	2.0 (1.1)
todkrank 'terminally ill'	1–3	1.2 (0.5)	1.2 (0.4)	1.0 (0.0)	1.3 (0.7)
tolerant 'tolerant'	1–6	3.2 (1.5)	2.9 (1.4)	4.1 (1.2)	2.5 (1.6)
topmotiviert 'highly motivated'	1–7	2.7 (1.6)	2.0 (1.4)	3.4 (1.6)	2.8 (1.6)
tot 'dead'	1–3	1.2 (0.6)	1.1 (0.3)	1.0 (0.0)	1.5 (0.8)
traurig 'sad'	1–7	2.3 (1.7)	2.7 (2.2)	2.1 (1.0)	2.2 (1.8)
treu 'loyal'	1–7	3.7 (2.0)	2.3 (1.3)	5.0 (1.6)	3.9 (2.1)
tüchtig 'capable'	1–7	4.0 (2.2)	4.5 (2.5)	4.4 (1.6)	3.2 (2.2)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
überfordert 'overwhelmed'	1–6	1.8 (1.3)	2.1 (1.4)	2.0 (1.6)	1.4 (0.7)
übergewichtig 'overweight'	1–6	2.6 (1.5)	2.3 (1.2)	2.6 (1.6)	2.8 (1.9)
überglücklich 'overjoyed'	1–7	2.4 (1.6)	2.5 (1.7)	2.5 (1.6)	2.1 (1.8)
übermüdet 'overtired'	1–6	2.2 (1.3)	1.8 (1.0)	2.6 (1.5)	2.3 (1.3)
überrascht 'surprised'	1–7	2.4 (1.6)	2.5 (1.8)	2.8 (1.4)	1.9 (1.4)
unaufdringlich 'unobtrusive'	1–7	3.6 (2.1)	3.3 (2.0)	3.5 (2.1)	3.9 (2.4)
unbelastet 'unencumbered'	1–4	1.8 (0.8)	1.9 (1.0)	1.8 (0.8)	1.6 (0.7)
unbesorgt 'unconcerned'	1–6	2.1 (1.3)	2.3 (1.6)	2.1 (1.0)	2.0 (1.2)
unerfahren 'inexperienced'	1–5	2.0 (1.3)	1.6 (1.0)	2.2 (1.5)	2.2 (1.4)
unfähig 'unable'	1–7	2.0 (1.4)	2.7 (1.9)	1.6 (0.7)	1.6 (1.0)
unfruchtbar 'infertile'	1–7	1.6 (1.3)	1.3 (0.7)	1.7 (1.3)	1.7 (1.9)
ungläubig 'incredulous'	1–7	3.1 (1.7)	2.8 (1.5)	3.5 (2.1)	3.1 (1.6)
unhöflich 'impolite'	1–7	4.5 (2.1)	5.6 (2.1)	5.2 (0.9)	2.6 (2.0)
unmusikalisch 'unmusical'	1–6	2.4 (1.4)	2.2 (0.9)	2.8 (1.6)	2.2 (1.6)
unruhig 'restless'	1–7	2.2 (1.3)	1.7 (0.7)	2.8 (1.8)	2.1 (1.2)
unschuldig 'innocent'	1–6	2.1 (1.5)	2.5 (1.5)	2.5 (2.0)	1.4 (0.7)
unsensibel 'insensitive'	1–7	3.1 (1.7)	3.8 (1.9)	3.5 (1.8)	1.9 (0.6)
unsterblich 'immortal'	1–6	1.7 (1.4)	1.7 (1.3)	2.1 (1.9)	1.2 (0.6)
unterzuckert 'hypoglycemic'	1–6	2.2 (1.4)	2.2 (1.0)	2.9 (1.9)	1.4 (0.7)
unverschämt 'outrageous'	1–7	4.2 (2.1)	5.0 (1.9)	5.2 (2.0)	2.4 (1.3)
unzufrieden 'dissatisfied'	1–7	2.8 (1.6)	3.1 (1.8)	3.0 (1.7)	2.4 (1.4)
unzuverlässig 'unreliable'	1–7	3.0 (1.8)	3.4 (1.8)	3.7 (2.1)	1.9 (1.0)
verärgert 'upset'	1–7	2.7 (2.0)	3.4 (2.3)	3.1 (2.1)	1.5 (0.5)
verblüfft 'perplexed'	1–7	2.5 (1.5)	2.1 (1.2)	2.3 (0.9)	3.1 (2.1)
vergesslich 'forgetful'	1–5	2.1 (1.1)	2.3 (1.1)	2.2 (1.2)	1.9 (1.0)
verheiratet 'married'	1–7	3.2 (2.0)	2.6 (1.3)	2.8 (2.1)	4.2 (2.3)
verkleidet 'disguised'	1–7	4.7 (2.0)	4.2 (1.9)	4.3 (2.1)	5.5 (1.8)
verletzt 'hurt'	1–7	2.4 (1.8)	3.1 (2.3)	2.3 (1.9)	1.7 (0.9)
verliebt 'in love'	1–5	2.6 (1.4)	2.2 (1.3)	2.9 (1.5)	2.7 (1.5)
verlobt 'engaged'	1–7	3.3 (2.0)	3.1 (2.1)	2.6 (1.6)	4.1 (2.0)
vernünftig 'reasonable'	1–7	3.2 (1.8)	3.0 (1.8)	3.9 (1.7)	2.6 (1.8)

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Table F.1 – *Continued from previous page*

Adjective	Range	Mean rating (SD)			
		overall	*absichtlich*	*bewusst*	*freiwillig*
verrückt 'insane'	1–7	3.2 (1.8)	3.6 (1.6)	3.7 (2.2)	2.3 (1.3)
verschmitzt 'mischievous'	1–7	3.0 (1.8)	2.4 (1.6)	4.1 (1.5)	2.6 (2.0)
verschmust 'cuddly'	1–7	2.8 (1.6)	2.1 (0.9)	2.8 (1.5)	3.5 (2.0)
verwaist 'orphaned'	1–2	1.2 (0.4)	1.1 (0.3)	1.3 (0.5)	1.2 (0.4)
verwirrt 'confused'	1–5	1.8 (1.3)	2.6 (1.8)	1.6 (1.0)	1.2 (0.4)
verwitwet 'widowed'	1–4	1.5 (0.8)	1.7 (0.8)	1.6 (1.0)	1.3 (0.5)
vielseitig 'versatile'	1–6	2.8 (1.5)	2.7 (1.4)	3.5 (1.5)	2.2 (1.3)
volljährig 'of age'	1–6	1.6 (1.1)	1.5 (1.0)	1.4 (0.7)	1.9 (1.5)
vorbildlich 'exemplary'	1–7	3.6 (2.0)	3.4 (1.2)	4.9 (2.1)	2.5 (1.9)
vorsichtig 'careful'	1–7	5.0 (1.8)	6.2 (0.8)	5.8 (1.3)	3.1 (1.4)
wach 'awake'	1–7	3.5 (2.0)	4.1 (2.0)	2.5 (1.4)	4.0 (2.3)
wahnsinnig 'insane'	1–7	2.0 (1.5)	3.0 (2.1)	1.5 (0.8)	1.5 (0.7)
weiblich 'female'	1–7	2.3 (1.9)	2.9 (2.3)	2.5 (1.8)	1.4 (1.0)
weise 'wise'	1–5	2.2 (1.3)	2.3 (1.3)	2.5 (1.5)	1.7 (1.1)
wohlwollend 'benevolent'	1–7	3.8 (1.8)	3.5 (2.0)	4.1 (2.0)	3.7 (1.6)
wunderschön 'beautiful'	1–5	2.2 (1.4)	2.2 (1.5)	2.2 (1.6)	2.1 (1.1)
wütend 'furious'	1–6	3.1 (1.7)	4.1 (1.7)	2.6 (1.3)	2.6 (1.6)
zappelig 'fidgety'	1–7	3.0 (1.6)	3.3 (1.7)	3.6 (1.7)	2.0 (0.9)
zielbewusst 'purposeful'	1–7	3.1 (2.0)	3.8 (2.3)	3.2 (2.3)	2.4 (1.3)
zielstrebig 'determined'	1–7	4.2 (2.0)	3.4 (1.6)	5.7 (1.7)	3.4 (2.0)
zögerlich 'hesitant'	1–7	3.7 (1.9)	4.3 (2.1)	4.3 (1.7)	2.4 (1.4)
zornig 'angry'	1–7	2.9 (1.7)	2.9 (1.7)	3.8 (1.9)	2.1 (1.2)
zufrieden 'satisfied'	1–7	2.9 (1.8)	2.4 (1.0)	3.7 (2.0)	2.6 (2.0)
zurückhaltend 'reserved'	1–7	4.7 (1.9)	5.3 (1.3)	5.1 (1.6)	3.7 (2.5)
zutraulich 'trusting'	1–7	2.7 (1.7)	3.2 (2.3)	2.6 (1.3)	2.2 (1.2)
zuverlässig 'reliable'	1–7	2.8 (1.9)	3.2 (2.4)	3.2 (1.6)	1.9 (1.2)
zuversichtlich 'confident'	1–7	3.4 (2.1)	2.8 (2.1)	5.2 (1.8)	2.3 (1.1)
zynisch 'cynical'	1–7	4.2 (2.0)	5.0 (2.1)	4.8 (1.5)	2.9 (1.9)

G Items Used in Experiment 8

Table G.1: Item sentences used in Experiment 8. There were two additional conditions which are omitted here for brevity. They differed from the copular sentences only in that the verb was *verhielt sich* instead of *war*. The first adjective in an item pair is the stage-level and the second adjective is the individual-level one.

NR	Sentence
1	Andrea war abweisend, und zwar um das Date schneller zu beenden.
1	Andrea war verheiratet, und zwar um das Date schneller zu beenden.
2	Anja war aggressiv, und zwar um ihre Ziele besser zu erreichen.
2	Anja war beliebt, und zwar um die Rivalin besser zu erreichen.
3	Anna war altmodisch, und zwar um den Stiefvater nicht zu verärgern.
3	Anna war hochbegabt, und zwar um den Stiefvater nicht zu verärgern.
4	Beate war aufmerksam, und zwar um die Vögel im richtigen Moment zu erwischen.
4	Beate war bereit, und zwar um die Vögel im richtigen Moment zu erwischen.
5	Svenja war barbarisch, und zwar um die Wikinger für sich zu gewinnen.
5	Svenja war fit, und zwar um die Wikinger für sich zu gewinnen.
6	Clara war bescheiden, und zwar um die Stiefmutter von sich zu überzeugen.
6	Clara war hübsch, und zwar um die Stiefmutter von sich zu überzeugen.
7	Elena war chaotisch, und zwar um ihre Kreativität und ihren Innovationsgeist zu kultivieren.
7	Elena war drogensüchtig, und zwar um ihre Kreativität und ihren Innovationsgeist zu kultivieren.
8	Yannik war charmant, und zwar um die Schwiegermutter von sich zu überzeugen.
8	Yannik war promoviert, und zwar um die Schwiegermutter von sich zu überzeugen.
9	Elisa war defensiv, und zwar um die Anwälte aus dem Konzept zu bringen.
9	Elisa war komatös, und zwar um die Anwälte aus dem Konzept zu bringen.
10	Hannah war eigenwillig, und zwar um die Erzieher damit zu ärgern.
10	Hannah war betäubt, und zwar um die Erzieher damit zu ärgern.

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Table G.1 – *Continued from previous page*

NR	Sentence
11	Helena war energisch, und zwar um das Laufen hinter sich zu bringen.
11	Helena war schlank, und zwar um das Laufen hinter sich zu bringen.
12	Helga war engagiert, und zwar um die Arbeit schnell zu erledigen.
12	Helga war arbeitsunfähig, und zwar um die Arbeit schnell zu erledigen.
13	Jana war erwachsen, und zwar um Wodka für die Party zu kaufen.
13	Jana war verkleidet, und zwar um Wodka für die Party zu kaufen.
14	Sophie war freundlich, und zwar um die Eltern stolz auf sie zu machen.
14	Sophie war begabt, und zwar um die Eltern stolz auf sie zu machen.
15	Jasmin war fröhlich, und zwar um ihre Laune wieder zu verbessern.
15	Jasmin war geschminkt, und zwar um ihre Laune wieder zu verbessern.
16	Katja war gehorsam, und zwar um die Großeltern wieder zu beruhigen.
16	Katja war satt, und zwar um die Großeltern wieder zu beruhigen.
17	Julia war gerissen, und zwar um die Informantin zum Reden zu ermuntern.
17	Julia war spanisch, und zwar um die Informantin zum Reden zu ermuntern.
18	Laura war gierig, und zwar um die Schätze sich zu schnappen.
18	Laura war arm, und zwar um die Schätze sich zu schnappen.
19	Leonie war gutgläubig, und zwar um ihre Naivität als Alibi zu nutzen.
19	Leonie war neu, und zwar um ihre Naivität als Alibi zu nutzen.
20	Linda war gutherzig, und zwar um die Hexe über ihre wahren Absichten zu täuschen.
20	Linda war klein, und zwar um die Hexe über ihre wahren Absichten zu täuschen.
21	Lisa war hartherzig, und zwar um die Scheidung möglichst stark zu erschweren.
21	Lisa war unfruchtbar, und zwar um die Scheidung möglichst stark zu erschweren.
22	Marie war hartnäckig, und zwar um Kompromisse im Alltag zu vermeiden.
22	Marie war verwitwet, und zwar um Kompromisse im Alltag zu vermeiden.
23	Miriam war hemmungslos, und zwar um ihre Fantasien in Gänze auszuleben.
23	Miriam war emeritiert, und zwar um ihre Fantasien in Gänze auszuleben.
24	Nadine war humorvoll, und zwar um die Atmosphäre wieder zu entspannen.
24	Nadine war wunderschön, und zwar um die Atmosphäre wieder zu entspannen.
25	Sabine war ignorant, und zwar um ihren Mann absichtlich zu verärgern.
25	Sabine war tot, und zwar um ihren Mann absichtlich zu verärgern.
26	Sandra war impulsiv, und zwar um ihre Lehrer auf die Palme zu treiben.
26	Sandra war einarmig, und zwar um ihre Lehrer auf die Palme zu treiben.
27	Saskia war kindisch, und zwar um ihren Vater beim Abendessen zu verärgern.
27	Saskia war magersüchtig, und zwar um ihren Vater beim Abendessen zu verärgern.
28	Petra war kritisch, und zwar um die Azubis bei der Prüfung herauszufordern.
28	Petra war hässlich, und zwar um die Azubis bei der Prüfung herauszufordern.
29	Verena war liberal, und zwar um den Studenten viel Freiheit einzuräumen.
29	Verena war alt, und zwar um den Studenten viel Freiheit einzuräumen.
30	Adam war liebevoll, und zwar um die Kinder wieder zu beruhigen.
30	Adam war vielseitig, und zwar um die Kinder wieder zu beruhigen.
31	Alex war lustig, und zwar um die Clowns von sich zu überzeugen.
31	Alex war dick, und zwar um die Clowns von sich zu überzeugen.
32	Armin war männlich, und zwar um die Frau beim ersten Date zu beeindrucken.

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Table G.1 – *Continued from previous page*

NR	Sentence
32	Armin war berühmt, und zwar um die Frau beim ersten Date zu beeindrucken.
33	Daniel war nachlässig, und zwar um die Arbeit auf andere abzuwälzen.
33	Daniel war pensioniert, und zwar um die Arbeit auf andere abzuwälzen.
34	Dennis war natürlich, und zwar um seine Persönlichkeit der Welt zu zeigen.
34	Dennis war tätowiert, und zwar um seine Persönlichkeit der Welt zu zeigen.
35	Janina war nervös, und zwar um der Jury Angst vorzuspielen.
35	Janina war ohnmächtig, und zwar um der Jury Angst vorzuspielen.
36	Fritz war neugierig, und zwar um das Geheimnis endlich zu enthüllen.
36	Fritz war minderjährig, und zwar um das Geheimnis endlich zu enthüllen.
37	Heiko war passiv, und zwar um seine Frau nicht aufzubringen.
37	Heiko war heterosexuell, und zwar um seine Frau nicht aufzubringen.
38	Holger war pragmatisch, und zwar um seine Ziele schneller zu erreichen.
38	Holger war verlobt, und zwar um seine Ziele schneller zu erreichen.
39	Jakob war reserviert, und zwar um seine Gefühle besser zu verbergen.
39	Jakob war atemlos, und zwar um seine Gefühle besser zu verbergen.
40	Thomas war ritterlich, und zwar um die Prinzessin und den König zu beeindrucken.
40	Thomas war reich, und zwar um die Prinzessin und den König zu beeindrucken.
41	Jannik war selbstlos, und zwar um die Kameraden für sich zu gewinnen.
41	Jannik war bekannt, und zwar um die Kameraden für sich zu gewinnen.
42	Jonas war sexistisch, und zwar um die Frau bei der Debatte einzuschüchtern.
42	Jonas war gewaltig, und zwar um die Frau bei der Debatte einzuschüchtern.
43	Karl war skeptisch, und zwar um die Theorie in Frage zu stellen.
43	Karl war nackt, und zwar um die Theorie in Frage zu stellen.
44	Kilian war skrupellos, und zwar um die Konkurrenz konsequent auszuschalten.
44	Kilian war dünn, und zwar um die Konkurrenz konsequent auszuschalten.
45	Klaus war taktvoll, und zwar um Rücksicht auf andere zu nehmen.
45	Klaus war geimpft, und zwar um Rücksicht auf andere zu nehmen.
46	Lorenz war todernst, und zwar um die Geschäftslage klar darzustellen.
46	Lorenz war bleich, und zwar um die Geschäftslage klar darzustellen.
47	Nils war tolerant, und zwar um den Sträflingen eine weitere Chance zu geben.
47	Nils war halberfolgreich, und zwar um den Sträflingen eine weitere Chance zu geben.
48	Lukas war überrascht, und zwar um seine Freunde nicht zu enttäuschen.
48	Lukas war verwaist, und zwar um seine Freunde nicht zu enttäuschen.
49	Manuel war unruhig, und zwar um die Verdächtigen hinters Licht zu führen.
49	Manuel war sprachlos, und zwar um die Verdächtigen hinters Licht zu führen.
50	Marc war unschuldig, und zwar um die Kollegen in schlechtem Licht erscheinen zu lassen.
50	Marc war arbeitslos, und zwar um die Kollegen in schlechtem Licht erscheinen zu lassen.
51	Martin war verärgert, und zwar um seine Unzufriedenheit mit der Situation zu zeigen.
51	Martin war einsam, und zwar um seine Unzufriedenheit mit der Situation zu zeigen.
52	Ludwig war verrückt, und zwar um der Jury glaubhaft zu erscheinen.
52	Ludwig war ängstlich, und zwar um der Jury glaubhaft zu erscheinen.
53	Oliver war vorsichtig, und zwar um die Fallen im Labyrinth zu vermeiden.

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Table G.1 – *Continued from previous page*

NR	Sentence
53	Oliver war muskulös, und zwar um die Fallen im Labyrinth zu vermeiden.
54	Pascal war wahnsinnig, und zwar um die Medikamente vom Arzt zu bekommen.
54	Pascal war vergesslich, und zwar um die Medikamente vom Arzt zu bekommen.
55	Sonja war weiblich, und zwar um ihre Figur besonders zu betonen.
55	Sonja war aufgetakelt, und zwar um ihre Figur besonders zu betonen.
56	Tobias war wohlwollend, und zwar um die Lehrlinge besser zu betreuen.
56	Tobias war attraktiv, und zwar um die Lehrlinge besser zu betreuen.
57	Robin war zielbewusst, und zwar um das Studium schnell abzuschließen.
57	Robin war diplomiert, und zwar um das Studium schnell abzuschließen.
58	Peter war zielstrebig, und zwar um die Ausbildung erfolgreich zu beenden.
58	Peter war dienstbereit, und zwar um die Ausbildung erfolgreich zu beenden.
59	Simon war zufrieden, und zwar um die Kunden von dem Deal zu überzeugen.
59	Simon war kräftig, und zwar um die Kunden von dem Deal zu überzeugen.
60	Stefan war zynisch, und zwar um die Debatte schnell aufzuheizen.
60	Stefan war behindert, und zwar um die Debatte schnell aufzuheizen.

H

Adjectives Used in Experiment 10

Table H.1: Adjectives used in Experiment 10. P = permanent; L = long-lasting; S/L = ambiguous short-/long-lasting; S = short-lasting; SD = standard deviation.

Item	Condition	Adjective	Mean (SD)	Range
1	L	*arm* ‘poor’	4.14 (1.35)	2–6
1	P	*tot* ‘dead’	6.71 (0.76)	5–7
1	S	*müde* ‘tired’	2.43 (0.53)	2–3
1	S/L	*faul* ‘lazy’	5.71 (1.50)	3–7
2	L	*dick* ‘thick’	5.43 (1.27)	3–7
2	P	*alt* ‘old’	6.00 (0.82)	5–7
2	S	*wach* ‘awake’	3.86 (1.35)	2–6
2	S/L	*nett* ‘kind’	6.00 (1.41)	3–7
3	L	*fett* ‘fat’	4.57 (0.98)	3–6
3	P	*groß* ‘large’	6.43 (1.13)	4–7
3	S	*satt* ‘fed up’	2.57 (0.79)	2–4
3	S/L	*krank* ‘sick’	2.43 (0.53)	2–3
4	L	*klug* ‘smart’	6.71 (0.49)	6–7
4	P	*lang* ‘long’	6.86 (0.38)	6–7
4	S	*nackt* ‘naked’	1.71 (0.49)	1–2
4	S/L	*frech* ‘cheeky’	3.86 (1.35)	2–6
5	L	*dünn* ‘thin’	5.57 (1.13)	3–6
5	P	*blind* ‘blind’	6.00 (1.83)	2–7
5	S	*erregt* ‘excited’	2.57 (1.13)	1–4
5	S/L	*höflich* ‘polite’	6.86 (0.38)	6–7
6	L	*mager* ‘skinny’	5.43 (0.79)	4–6

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Table H.1 – *Continued from previous page*

Item	Condition	Adjective	Mean (SD)	Range
6	P	*klein* ‘small’	6.57 (0.53)	6–7
6	S	*wütend* ‘furious’	1.71 (0.49)	1–2
6	S/L	*fleißig* ‘diligent’	4.86 (2.27)	2–7
7	L	*reich* ‘rich’	5.71 (0.76)	5–7
7	P	*deutsch* ‘German’	6.14 (2.27)	1–7
7	S	*bleich* ‘pale’	3.29 (1.80)	1–6
7	S/L	*pingelig* ‘picky’	5.71 (1.25)	3–7
8	L	*loyal* ‘loyal’	6.29 (1.11)	4–7
8	P	*getauft* ‘baptized’	7.00 (0.00)	7–7
8	S	*munter* ‘bright’	3.14 (1.07)	2–5
8	S/L	*kindisch* ‘childish’	4.71 (1.11)	3–6
9	L	*füllig* ‘plump’	5.29 (1.11)	3–6
9	P	*hässlich* ‘ugly’	5.71 (2.14)	1–7
9	S	*betäubt* ‘stunned’	2.14 (0.69)	1–3
9	S/L	*gerissen* ‘cunning’	6.00 (1.53)	3–7
10	L	*liberal* ‘liberal’	5.86 (0.69)	5–7
10	P	*gebildet* ‘educated’	6.57 (0.53)	6–7
10	S	*errötet* ‘flushed’	1.43 (0.53)	1–2
10	S/L	*ignorant* ‘ignorant’	4.86 (2.12)	2–7
11	L	*gläubig* ‘believing’	6.43 (0.79)	5–7
11	P	*einarmig* ‘one-armed’	6.43 (1.13)	4–7
11	S	*atemlos* ‘breathless’	1.57 (0.79)	1–3
11	S/L	*taktvoll* ‘tactful’	4.86 (1.35)	3–6
12	L	*kräftig* ‘strong’	5.29 (0.95)	4–7
12	P	*verwaist* ‘orphaned’	7.00 (0.00)	7–7
12	S	*besorgt* ‘concerned’	2.29 (0.95)	1–3
12	S/L	*geduldig* ‘patient’	5.71 (1.11)	4–7
13	L	*schlank* ‘slim’	5.43 (1.13)	3–6
13	P	*spanisch* ‘Spanish’	6.86 (0.38)	6–7
13	S	*durstig* ‘thirsty’	1.71 (0.49)	1–2
13	S/L	*impulsiv* ‘impulsive’	6.14 (1.46)	3–7
14	L	*feminin* ‘feminine’	6.71 (0.49)	6–7
14	P	*verwitwet* ‘widowed’	6.43 (0.53)	6–7
14	S	*hungrig* ‘hungry’	1.71 (0.49)	1–2
14	S/L	*charmant* ‘charming’	5.57 (1.81)	2–7
15	L	*verlobt* ‘engaged’	4.00 (1.63)	2–7
15	P	*behindert* ‘disabled’	6.71 (0.49)	6–7
15	S	*traurig* ‘sad’	2.86 (1.21)	1–5
15	S/L	*neugierig* ‘curious’	4.57 (1.62)	2–6
16	L	*verliebt* ‘in love’	4.86 (1.21)	4–7
16	P	*tätowiert* ‘tattooed’	6.86 (0.38)	6–7
16	S	*verletzt* ‘hurt’	2.86 (0.90)	2–4
16	S/L	*kleinlich* ‘petty’	5.29 (1.25)	4–7
17	L	*muskulös* ‘muscular’	5.43 (1.13)	4–7

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Table H.1 – *Continued from previous page*

Item	Condition	Adjective	Mean (SD)	Range
17	P	*promoviert* 'with a PhD'	6.43 (0.79)	5–7
17	S	*hellwach* 'wide awake'	3.14 (0.69)	2–4
17	S/L	*zögerlich* 'hesitant'	3.86 (2.12)	1–7
18	L	*kindlich* 'childlike'	4.86 (1.07)	3–6
18	P	*autistisch* 'autistic'	6.43 (0.79)	5–7
18	S	*verärgert* 'upset'	2.00 (0.58)	1–3
18	S/L	*unsensibel* 'insensitive'	5.29 (1.80)	3–7
19	L	*rundlich* 'plump'	4.86 (1.07)	3–6
19	P	*hochbegabt* 'highly gifted'	6.00 (2.24)	1–7
19	S	*übermüdet* 'overtired'	2.29 (0.76)	1–3
19	S/L	*beherrscht* 'controlled'	3.43 (1.62)	2–6
20	L	*sportlich* 'athletic'	5.43 (0.53)	5–6
20	P	*volljährig* 'of age'	6.00 (1.73)	3–7
20	S	*aufgeregt* 'excited'	2.00 (0.58)	1–3
20	S/L	*hartherzig* 'hard-hearted'	5.86 (0.69)	5–7
21	L	*arbeitslos* 'unemployed'	4.00 (1.41)	2–6
21	P	*emeritiert* 'retired'	5.86 (1.46)	3–7
21	S	*betrunken* 'drunk'	2.29 (0.49)	2–3
21	S/L	*raffiniert* 'refined'	6.14 (1.46)	3–7
22	L	*kinderlieb* 'fond of children'	6.29 (0.49)	6–7
22	P	*braunäugig* 'brown-eyed'	7.00 (0.00)	7–7
22	S	*geschminkt* 'made up'	2.29 (1.25)	1–4
22	S/L	*schwermütig* 'melancholic'	3.43 (2.23)	1–7
23	L	*jugendlich* 'youthful'	3.71 (0.95)	3–5
23	P	*konfirmiert* 'confirmed'	6.43 (0.98)	5–7
23	S	*dehydriert* 'dehydrated'	1.57 (0.79)	1–3
23	S/L	*eigenwillig* 'headstrong'	5.86 (0.69)	5–7
24	L	*verheiratet* 'married'	6.43 (1.13)	4–7
24	P	*unfruchtbar* 'infertile'	7.00 (0.00)	7–7
24	S	*verkleidet* 'disguised'	2.43 (0.53)	2–3
24	S/L	*hemmungslos* 'uninhibited'	4.00 (1.41)	2–6
25	L	*berufstätig* 'employed'	5.43 (0.98)	4–7
25	P	*homosexuell* 'homosexual'	6.14 (1.86)	2–7
25	S	*bewusstlos* 'unconscious'	1.71 (0.76)	1–3
25	S/L	*organisiert* 'organized'	6.14 (1.21)	4–7
26	L	*magersüchtig* 'anorexic'	5.43 (0.79)	4–6
26	P	*musikalisch* 'musical'	6.43 (0.79)	5–7
26	S	*aufgekratzt* 'exhilarated'	2.43 (1.62)	1–6
26	S/L	*pragmatisch* 'pragmatic'	5.00 (2.31)	1–7
27	L	*idealistisch* 'idealistic'	5.71 (0.95)	5–7
27	P	*intelligent* 'intelligent'	6.71 (0.49)	6–7
27	S	*konzentiert* 'concentrated'	2.29 (0.95)	1–4
27	S/L	*nachdenklich* 'thoughtful'	3.14 (1.21)	2–5
28	L	*minderjährig* 'underage'	4.57 (1.72)	2–7

Continued on next page

Table H.1 – *Continued from previous page*

Item	Condition	Adjective	Mean (SD)	Range
28	P	*pensioniert* 'retired'	6.43 (0.79)	5–7
28	S	*erleichtert* 'relieved'	1.71 (0.49)	1–2
28	S/L	*inkonsequent* 'inconsistent'	5.29 (1.11)	3–6
29	L	*übergewichtig* 'overweight'	5.14 (1.07)	3–6
29	P	*dunkelhäutig* 'dark-skinned'	7.00 (0.00)	7–7
29	S	*überfordert* 'overwhelmed'	2.57 (0.79)	2–4
29	S/L	*leichtsinnig* 'reckless'	6.00 (1.83)	2–7
30	L	*intellektuell* 'intellectual'	6.57 (0.53)	6–7
30	P	*heterosexuell* 'heterosexual'	6.57 (0.53)	6–7
30	S	*unterzuckert* 'hypoglycemic'	1.71 (0.95)	1–3
30	S/L	*ambitioniert* 'ambitious'	4.57 (2.30)	2–7
31	L	*braungebrannt* 'tanned'	3.29 (0.95)	2–5
31	P	*österreichisch* 'Austrian'	6.14 (2.27)	1–7
31	S	*ausgehungert* 'starved'	2.29 (1.50)	1–5
31	S/L	*anspruchslos* 'undemanding'	5.14 (1.95)	2–7
32	L	*drogenabhängig* 'addicted to drugs'	5.14 (1.21)	4–7
32	P	*niederländisch* 'Dutch'	7.00 (0.00)	7–7
32	S	*ausgeschlafen* 'alert'	3.29 (1.25)	2–5
32	S/L	*diszipliniert* 'disciplined'	6.00 (1.00)	4–7

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