Action sensitivity in grammar
Introduction: what are intentions?

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1 What are intentions?

- *Theory of Mind* (ToM) refers to our cognitive ability to ascribe mental states to other people and explain their behaviour in terms of these mental states.
- Because of ToM, we can tell lies, attribute desires and beliefs to each other, and influence each other's behaviour by influencing sets of desires and beliefs.
- ToM is not the best piece of terminology. It presupposes the existence of a theory of mental realm. There are other terms used for our mentalistic abilities *folk psychology* and *naive psychology*.
- *Intentions* are mental states of a particular kind and thus, are part of ToM. They are necessary for planning and performing individual and joint actions and for assigning responsibility for these actions.

> "Suppose that you have been wondering what colour to paint your front door. You have narrowed the options to two: dark red, or dark blue. Both would be nice; both are available. But time is pressing, and you need to decide. So you make your choice. Blue it is. As a result of your choice you have acquired a new mental state." (Holton, 2009, 1)

Figure 1: Your intentions are important for the success of an action, for example, when the store with blue paint is closed tomorrow (adapted from Holton 2009).

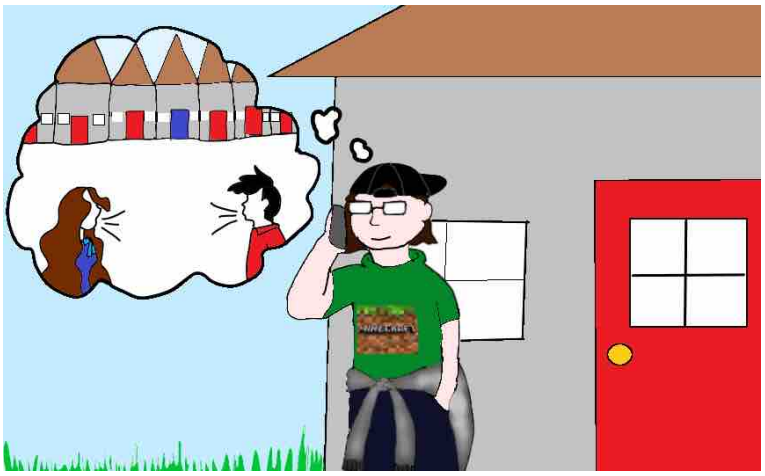

Figure 2: Your intentions are important for collaboration with others, for example, when the best way for them to recognize your house is by the colour of the front door (adapted from Holton 2009).

2 Psychological reality of intentions

2.1 Intentions in children

- The distinction between intentional and accidental actions is acquired very early, during the first year of life. Developmental researchers have discovered that infants as early as 9-month-old can distinguish between intentional and accidental actions.

- For example, infants react with greater patience to adult's inability to provide a toy due to an obstacle as compared to teasing, Also infants correctly imitate intended, but accidentally unfinished or distorted, facial movements (Baillargeon et al., 2011; Gergely, 2011).

- It has also been shown that young children (preschoolers) overattribute intentionality. They correctly say that intentional actions like sitting down in a chair are volitional, but they also tend to say that unintentional actions like sneezing and slipping on a rug are done on purpose. Preschoolers also overextend intentionality to physical events (Miller and Aloise, 1989).

2.2 Intentions in adults

- Adults have stable, but gradable, intentionality judgements see Figure 3 from Rosset 2008. In a pilot study, participants ($n = 26$) were asked to judge sentences as done 'on purpose' vs. 'accidentally'. Intentionality Likelihood Ranking (ILR) is the percentage of participants who checked the 'on purpose' box.

- Our judgements about intentionality are automatic. For example, Heider and Simmel's (1944) illusion demonstrates that we irresistibly assign intentions to geometric forms based on their behaviour (`https://www.youtube.com/watch?v=gLeGhIOy8pw`).

- One of the characteristics of automatic behaviour is that it can be altered upon careful reflection. This is shown by *intentionality bias* in Rosset 2008 and replicated in Strickland et al. 2014.

- In Rosset 2008, participants ($n = 90$) were asked to judge control (x2) and test (x2) sentences from Figure 3 as done 'on purpose' or 'accidentally' in two conditions: speeded (2.4 sec per sentence) and unspeeded (5 sec per sentence).

Study 1 stimuli, with intentionality likelihood ratings (ILR) from pilot study

Control sentences		Test sentences			
Unambiguously accidental	Unambiguously intentional	Prototypically accidental	ILR	Neutral/prototypically intentional	ILR
He poked himself in the eye	He buttoned his jacket	He hit the man with his car	0	She cut him off driving	46
He sneezed from allergies	He drew a picture of the beach	He gave her the wrong change	0	The boy knocked over the sand castle	46
He stubbed his toe	He erased the scribbles	She burnt the meal	0	She walked by without saying hello	46
He failed the driving test	He folded the letter carefully	She broke the vase	0	He took an illegal left turn	50
He fell down the stairs	He listened attentively	He tracked mud inside	0	He ripped the piece of paper	57
He fell off the skateboard	He shaved in front of the mirror	He forgot his homework	4	She sprayed him with water	69
He missed the hoop with the ball	He threw the football	He arrived 5 min late for class	4	The man left without leaving a tip	73
He pinched his fingers in the door	He typed the email	He bumped into a classmate in the hall	4	She made a mark on the paper	77
He broke his tooth playing hockey	He vacuumed the carpet	He broke the window	4	She drove over the speed limit	81
She tripped on the curb	She addressed the letter	The painter inhaled the fumes	8	He deleted the email	88
She caught a cold	She baked a cake	He drank the spoiled milk	8	She ignored the question	88
She lost her keys	She changed the flat tire	She woke the baby up	15	She averted her eyes	92
She broke her cell phone	She followed the recipe	He stepped in the puddle	15		
She slipped on the ice	She looked for her keys	He set off the alarm	15		
She blushed from embarrassment	She painted her toe nails	He jumped when the bell rang	15		
She burned her hand on the stove	She proofread her paper	He dripped paint on the canvas	23		
She jumped back in surprise	She studied for the exam	She kicked her dog	27		
She tripped on the jump rope	She threaded the needle	She left the water running	27		
The boy hiccupped	The boy smiled for the picture	He set the house on fire	31		
The girl had a seizure	The girl lit the candle	He ate the bruised part of the apple	31		
		She told the same joke twice	35		
		The girl popped the balloon	38		

Figure 3: Gradable intentionality judgements from Rosset 2008.

- Main results: ambiguous sentences are judged as done 'on purpose' significantly more often in the speeded condition than in unspeeded condition (intentionality bias). The effect is more pronounced with accidental test sentences.(A result is statistically significant if p value does not exceed 0.05.)

Results for Study 1, comparing % of sentences in each condition judged to be on purpose

	Control sentences		Test sentences		
	Intentional	Accidental	All	Accidental	Neutral/ Int.
Unspeeded	98	2	33	15	66
Speeded	98	5	39	22	69
	ns	$p < .02$	$p < .01$	$p < .001$	ns

Figure 4: Intentionality bias (Rosset, 2008).

- Finally, it has been shown that individuals with different mental challenges have various disorders concerning their sense of agency. For example, individuals with obsessive-compulsive disorder (OCD) are shown to have reduced sense of agency (Oren et al., 2016). Individuals with schizophrenia, on the other hand, are reported to have inflated sense of agency.

3 Syntactic cues for intentionality (Strickland et al., 2014)

3.1 Hypothesis

> "Our hypothesis is that the use of syntactic cues will show the trademark properties of an automatic link to theory-of-mind. In other words, when people hear about a behaviour, they may have deeper, more reflective way of determining whether or not it was performed intentionally, but at the same time they might also be able to make use of a simple heuristic that draws on syntactic cues." (Strickland et al., 2014, 251)

- Heuristic strategy (mental shortcuts based on previous experience, loosely connected to the present situation): subjects are usually assigned the AGENT theta-role, AGENTs typically behave intentionally, therefore subjects are interpreted as acting intentionally.

(1) a. John rolled the ball.
b. John married Susan.

- Upon reflection: consider the event described by a sentence in a more reflective manner.

(2) a. John married Susan. (symmetric)
b. ⇒ Susan married John.

3.2 Experiment 1: intentionality bias

- Participants ($n = 43$) were asked to judge whether an underlined argument acted intentionally or accidentally in two conditions: speeded (mean RT = 1.26 sec) and unspeeded (mean RT = 2.73 sec).

(3) a. Sam ran into Tricia. (speeded: M=.8, unspeeded: M=.45)
b. Cole consulted Britney. (speeded: M=.2, unspeeded: M=.45)

- Main results: Rosset's (2008) findings that there is intentionality bias is confirmed with respect to grammatical subjects. Additionally, unintentionality bias is found for grammatical objects. (A result is statistically significant if error bars do not overlap.)

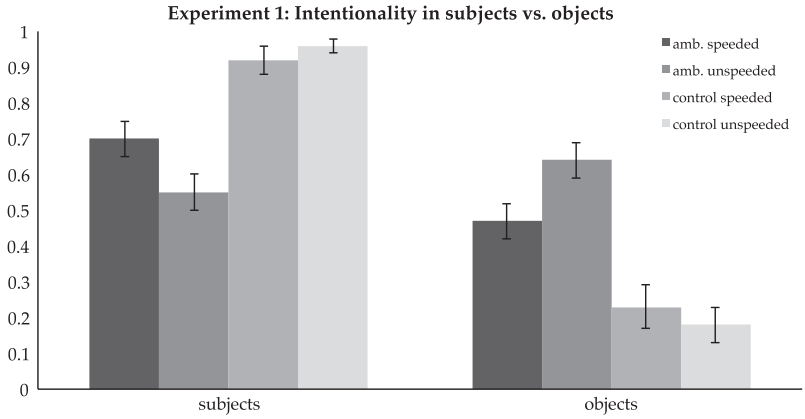

Figure 5: Proportions of "intentional" answers for each condition in Experiment 1.

3.3 Experiment 2: symmetric actions and argument position

- Each participant ($n = 236$) saw one sentence and judged intentionality of one actor in a symmetric or partially symmetric action on the scale from 1 (not at all intentional) to 7 (fully intentional).

  (4) a. John exchanged shoes with Susan. (partially symmetric)
  b. Susan exchanged shoes with John.

- Main results: both by-participant and by-item (non-parametric) analyses showed that grammatical subjects are judged as having acted more intentionally than grammatical objects (by-participant: $p < .001$; by-item: $p < .01$). Also, word order does not affect intentionality judgements.

  (5) John and Susan exchanged books.

  (6) a. It was John that exchanged books with Susan.
  b. It was John that Susan exchanged books with.

3.4 Experiment 3: training intervention

- Participants ($n = 111$) were first asked about their intentionality judgements for grammatical subjects and objects in partially symmetric and non-symmetric sentences (similar to Experiment 2). Then, there was an intervention phase during which participants were exposed to inferences in symmetric and non-symmetric actions. Then, participants were re-tested on a different set of symmetric and non-symmetric sentences.

- Prediction: grammatical subjects are judged more intentionally than grammatical objects, but in the (partially) symmetric condition, this effect is weakened or removed in the post-intervention phase.

- Main results: mixed results...

intentionality of...	pre-intervention	post-intervention	
	by-participant		
subjects	M = 6.33	M = 6.3	p = .97
objects	M = 4.86	M = 5.17	p < .05
	by-item		
subjects	M = 6.28	M = 6.27	p = .92
objects	M = 4.84	M = 5.05	p = .075

Table 1: Intentionality for symmetric actions

intentionality of...	pre-intervention	post-intervention	
	by-participant		
subjects	M = 4.35	M = 4.3	p = .61
objects	M = 1.99	M = 1.78	p < .001

Table 2: Intentionality for non-symmetric control items

3.5 Questions

- Do the findings in Experiment 1-3 support the hypothesis? Which findings are the most robust and what do they show?
- How best to describe the heuristic strategy given the findings in Experiment 1-3 in terms of grammatical subject-object positions or in terms of theta-roles (e.g., AGENT, PATIENT)? How should we modify the experiments to probe into the role of AGENTs, PATIENTs, rather than subjects and objects?

4 Linguistic phenomena sensitive to interpretation of an action

4.1 Subjunctive obviation and exceptions to it

- In many European languages (most notably in Romance languages, but also in Hungarian, Slavic, and others), the subject of the subjunctive clause cannot co-refer with the subject of the matrix clause (Bouchard, 1983; Ruwet, 1991; Farkas, 1992; Costantini, 2006; Schwarz, 2005; Schlenker, 2011; Szabolcsi, to appear).

(7) a. Je dis que je pars. (French)
I say that I leave-IND
'I say that I leave.'

b. * Je veux que je parte.
I want that I leave-SUBJ
'I want for me to leave.'

- This restriction is lifted when the degree of agency or intentions of the embedded subject, the matrix subject or both is reduced.

(8) a. Je veux absolument que j' amuse ces enfants.
I want absolutely that I amuse-SUBJ these children
'I absolutely want for me to amuse the children.'

b. Je voudrais bien que je parte tôt.
I want-COND well that I leave-SUBJ early
'I would like it well for me to leave early.'

- Other phenomena of *Generalized Subject Obviation* show similar effects.

4.2 Polarity system and action sensitivity

- Polarity phenomena concern restrictions on certain expressions depending on whether they occur in (roughly) positive or negative sentences.

(9) a. * John ate any cookies/a damn thing.
b. John didn't eat any cookies/a damn thing.

(10) a. John talked with someone.
b. John didn't talk with someone.
= there is a person with whom John didn't talk (some > not)
≠ John talked with nobody (not > some)

- Collins and Postal (2014) observe that Negative Polarity Items like *a damn thing* are acceptable in the infinitive of intentional verbs, but not in the infinitive of accidental verbs.

(11) a. Byron refused to do a damn thing.
b. * Jane forgot to do a damn thing.

- Szabolcsi (2004) observes that Positive Polarity Items like *someone* are acceptable in the infinitival complement of *want* with accidental actions, but not with intentional actions.

(12) a. I don't want to offend someone. (not>some)
b. I don't want to break something. (not>some)

(13) a. I don't want to call someone. (*not>some)
b. I don't want to eat something. (*not>some)

- Free Choice Items like *any* in *You can take any book* are restricted to intentional actions in some languages, e.g., Spanish, Korean (Choi and Romero, 2008; Alonso-Ovalle and Menendez-Benito, 2017).

(14) a. ?? Juan tropezó con un objeto **cualquiera**. (Spanish)
'Juan stumbled against a random object.'
b. Juan necesitaba un pisapapeles, de modo que cogió un libro **cualquiera** dela estantería y lo puso encima de la pila.
'Juan needed a paperweight, so he took a random book from the shelf and put it on top of the pile.'

4.3 Aspect in Slavic

- Across Slavic languages, negative imperatives are generally ill-formed with perfective verbs (Forsyth, 1970; Paducheva, 2013; Despić, 2020).

(15) a. Otkryvaj/Otkroj okno! (Russian)
open-IPFV/open-PFV window
'Open the window!'
b. Ne otkryvaj/*otkroj okno!
not open-IPFV/open-PFV window
'Don't open the window!'

- However, when the action is interpreted as unintentional or accidental, the perfective is acceptable.

(16) Smotri, (slučajno) ne otkryvaj/otkroj okno!
watch.out by.chance not open-IPFV/open-PFV window
'Careful! Don't accidentally open the window!'

- In Eastern Slavic (Belarus, Russian, Ukrainian), the same effect is found with the infinitival complement of *want*:

(17) a. Ja ne xoču uxodit'/*ujti. (Russian)
I not want leave-IPFV/*leave-PFV
'I don't want to leave.'

b. Ja ne xoču poterjat' kluči.
I not want lose-PFV keys
'I don't want to lose the keys.'

4.4 SE/SELF reflexives in Dutch

- In Dutch (but not German), the choice between SE/SELF reflexives is governed (among other factors) by the interpretation of an action as intentional versus accidental (ter Meulen, 2000; Oya, 2010; Hendriks et al., 2015).

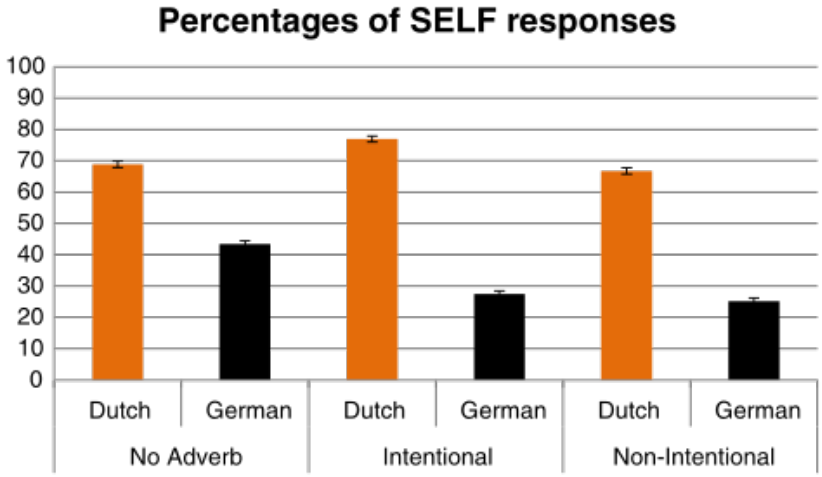

Fig. 2 Percentages of SELF ('zichzelf' or 'sich selbst') responses for the same set of items without adverb (No Adverb), with intentional adverb (Intentional), or with non-intentional adverb (Non-Intentional), per language

Figure 6: SE/SELF in Dutch and German

4.5 Nominal marking and 'out-of-control' morphology

- Some other phenomena sensitive to the interpretation of an action concern case assignment in languages like Hindi/Urdu, Georgian, and Central Pomo (Tuite et al., 1985; Mithun, 1991).

(18) a. Ram=**ne** khas-a. (Hindi/Urdu)
Ram-ERG coughed (purposefully)
b. Ram khas-a.
Ram-NOM coughed (accidentally)

- St'át'imcets/Lillooet (Salish) has a dedicated 'out-of-control' circumfix **ka…a** (Demirdache, 1997; Davis et al., 2009).

(19) a. sek'w-p ti nk'wan'ústen-a (Salish)
'the window broke'
b. **ka**-sek'w-**a** ti nk'wan'ústen-a
'the window was accidentally/suddenly broken'

References

Alonso-Ovalle, Luis, and Paula Menendez-Benito. 2017. Projecting possibilities in the nominal domain: Spanish uno cualquiera. *Journal of Semantics* 1–41.

Baillargeon, Renée, Jie Li, Yael Gertner, and Di Wu. 2011. How do infants reason about physical events? In *The wiley-blackwell handbook of childhood cognitive development*, ed. Usha Goswami, 11–48. Malden, MA: Wiley Blackwell.

Bouchard, Denis. 1983. The avoid pronoun principle and the elsewhere principle. In *Proceedings of NELS 13*, 29–36. Amherst: Univeristy of Massachusetts, GLSA.

Choi, Jinyoung, and Maribel Romero. 2008. Rescuing existential free choice items in episodic sentences. *Empirical Issues in Syntax and Semantics* 7:77–98.

Collins, Chris, and Paul M. Postal. 2014. *Classical NEG Raising*. Cambridge: The MIT Press.

Costantini, Francesco. 2006. Subjunctive obviation: an interface perspective. Doctoral Dissertation, Ca' Foscari University of Venice.

Davis, Henry, Lisa Matthewson, and Hotze Rullmann. 2009. 'Out of control' marking as circumstantial modality in St'át'imcets. In *Cross-linguistic Semantics of Tense, Aspect and Modality*, ed. Lotte Hogeweg, Helen de Hoop, and Andrej Malchukov, 205–244. Amsterdam / Philadelphia: John Benjamins Publishing Company.

Demirdache, Hamida. 1997. 'Out of control' in Salish and event (de)composition. In *Theoretical Issues at the Morphology-syntax Interface*, ed. A. Mendikoetxea and M. Uribe-Etxebarria, 97–144.

Despić, Miloje. 2020. Negative imperatives and aspect: a phase-based approach. In *Current Developments in Slavic Linguistics: Twenty Years After*, ed. P. Kosta and T. Radeva-Bork. Bern: Peter Lang.

Farkas, Donka F. 1992. On obviation. In *Lexical Matters*, ed. Ivan A. Sag and Anna Szabolcsi, chapter 4, 85–110. Stanford, Calif.: Center for the Study of Language and Information.

Forsyth, James. 1970. *A Grammar of Aspect: Usage and Meaning in the Russian Verb*. Cambridge: Cambridge University Press.

Gergely, György. 2011. Kinds of agents: The origins of understanding instrumental and communicative agency. In *The Wiley-Blackwell Handbook of Childhood Cognitive Development*, ed. Usha Goswami, 76–105. Malden, MA: Wiley Blackwell.

Heider, F., and M. Simmel. 1944. An experimental study of apparent behaviour. *American Journal of Psychology* 57:243–59.

Hendriks, Petra, John C. J. Hoeks, and Jennifer Spenader. 2015. Reflexive choice in Dutch and German. *Journal of Comparative German Linguistics* 17:229–252.

Holton, Richard. 2009. *Willing, Wanting, Waiting*. Oxford: Clarendon Press.

ter Meulen, Alice G.S. 2000. On the economy of interpretation: Semantic constraints on SE-reflexives in Dutch. In *Interface strategies.*, ed. Hans J. Bennis, Martin Everaert, and Eric Reuland, 239–255. Amsterdam: KNAW.

Miller, Patricia H., and Patricia A. Aloise. 1989. Young children's understanding of the psychological causes of behavior: A review. *Child Development* 60:257–285.

Mithun, Marianne. 1991. Active/agentive case marking and its motivations. *Language* 67:510–546.

Oren, Ela, Naama Friedmann, and Reuven Dar. 2016. Things happen: Individuals with high obsessive-compulsive tendencies omit agency in their spoken language. *Consciousness and Cognition* 42:125–134.

Oya, Toshiaki. 2010. Three types of reflexive verbs in German. *Linguistics* 48:227–257.

Paducheva, Elena V. 2013. *Russkoe Otricatel'noe Predlozhenie*. Moscow: Jazyki slavjanskoi kul'tury.

Rosset, Evelyn. 2008. It's no accident: Our bias for intentional explanations. *Cognition 108* 108:771–780.

Ruwet, Nicolas. 1991. *Syntax and Human Experience*. Chicago: University of Chicago Press.

Schlenker, Philippe. 2011. Indexicality and de se reports. In *Semantics: An International Handbook of Natural Language Meaning*, ed. Claudia Maienborn, Klaus von Heusinger, and Paul Portner, 1561–1604. Berlin: Mouton de Gruyter.

Schwarz, Bernhard. 2005. Modal Superlatives. *Proceedings from Semantics and Linguistic Theory* 15:187–204.

Strickland, Brent, Matthew Fisher, Frank Keil, and Joshua Knobe. 2014. Syntax and intentionality: An automatic link between language and theory-of-mind. *Cognition* 133:249–261.

Szabolcsi, Anna. 2004. Positive polarity – negative polarity. *Natural Language and Linguistic Theory* 22:409–452.

Szabolcsi, Anna. to appear. Obviation in hungarian: What is its scope, and is it due to competition? *Glossa* .

Tuite, Kevin J., Asif Agha, and Randolph Graczyk. 1985. Agentivity, transitivity, and the question of active typology. In *Chicago Linguistic Society Parasession on Causatives and Agentivity*, volume 21, 252–70.