Priming Effects on Event Type Classification

effects of word and picture stimuli

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Event Types (ET)

ET	[DYN]	[DUR]	[RES]	examples
States (STA)	-	+	-	to know, to be tall
Activities (ACT)	+	+	-	to sing, to walk
Accomplishments (ACC)	+	+	+	to eat an apple, to walk to the fence
Achievements (ACH)	+	-	+	to land, to die

Vendler's four-way classification:
classes are cross-classified with respect to the features of dynamicity (DYN), durativity (DUR) and resultativity (RES)

* crucial role in the sentence's temporal constitution
* extensive literature, little experimental investigation

Research Questions

* how are ETs represented, retrieved and processed in the mental lexicon?
* do ETs give rise to semantic priming effects?
* do such effects occur:
  - at the lexical level (word stimuli)?
  - at a deeper conceptual level (picture stimuli)?

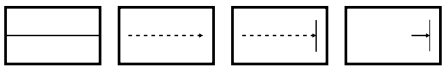
Previous study:

* Bonnotte 2008: ET facilitation priming in French
* differences: picture stimuli, longer SOA (300 ms and 700 ms), stimuli controlled for semantic class

Pilot Studies

Pilot study 1:

* aim: assess ET annotation for verb stimuli
* procedure: web-based, 20 participants choose one of four graphical representations of ETs
* results: all items: $\alpha = 0.36$; $\alpha_w = 0.45$
  42 selected items: $\alpha = 0.37$; $\alpha_w = 0.48$



Graphical representations of ETs: STA, ACT, ACC, ACH (cfr. Bonnotte 2008)

Pilot study 2:

* aim: assess ET annotation for picture stimuli (IPNP, Bates et al. 2000)
* procedure: as in Pilot study 1
* results: all items: $\alpha = 0.23$; $\alpha_w = 0.32$
  42 selected items: $\alpha = 0.36$; $\alpha_w = 0.52$

Experiment 1

Aim: ET priming effects at the word level
Participants: 48 native Italian students
Materials: 36 prime-target pairs, 6 per condition

	target ACH	target ACT
neutral prime	XXX - sparare XXX - *to shoot*	XXX - dormire XXX - *to sleep*
opposite prime	ballare - sparare *to dance - to shoot*	entrare - dormire *to enter - to sleep*
similar prime	entrare - sparare *to enter - to shoot*	ballare - dormire *to dance - to sleep*

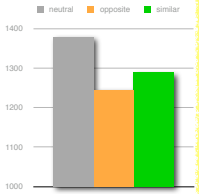
Tasks: answer with Yes/No buttons (right/left hand)

* **DUR** task:*"does the target denote a process lasting over a period of time?"*
* **RES** task: *"does the target denote an event with a clear outcome?"*

Design: 2x3 within-subj., + task between-subj.

Results:

* high accuracy (0.86); 0.89 for DUR, .82 for RES);
* general facilitation effect on decision latencies (neutral prime used as baseline)
* significant effect of target's ET



mean decision latencies

* separate analyses:
  - effect of opposite primes on ACH for DUR and RES
  - effect of similar primes on ACT for DUR

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)	
(Intercept)	9.49	9.66	-12.78	30.79	0.16	0.00	
primeopp	-0.09	-0.09	-0.14	-0.04	0.00	0.00	***
primesim	-0.05	-0.05	-0.10	-0.01	0.02	0.02	*
etACT	-0.10	-0.11	-0.21	0.00	0.06	0.04	*
taskris	0.09	0.09	0.00	0.18	0.06	0.12	

Experiment 1, mixed effect model, general analysis: log(dl) ~ prime + (1|sub j) + (1|verb) + (1|sem cl)

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)	
DUR, ACH targets							
(Intercept)	9.48	9.48	9.34	9.62	0.00	0.00	
primeopp	-0.10	-0.10	-0.18	-0.02	0.02	0.02	*
primesim	-0.03	-0.03	-0.11	0.05	0.47	0.45	
DUR, ACT targets							
(Intercept)	9.40	9.40	9.23	9.56	0.00	0.00	
primeopp	-0.06	-0.06	-0.15	0.02	0.13	0.12	
primesim	-0.11	-0.11	-0.20	-0.03	0.01	0.01	**
RES, ACH targets							
(Intercept)	9.61	9.60	9.45	9.77	0.00	0.00	
primeopp	-0.15	-0.15	-0.26	-0.04	0.01	0.01	**
primesim	-0.06	-0.06	-0.16	0.06	0.32	0.29	
RES, ACT targets							
(Intercept)	9.45	9.45	9.32	9.58	0.00	0.00	
primeopp	-0.07	-0.07	-0.17	0.03	0.16	0.14	
primesim	-0.02	-0.02	-0.12	0.08	0.71	0.66	

Experiment 1, mixed effect model, separate analyses: log(dl) ~ prime + (1|sub j) + (1|verb) + (1|sem cl)

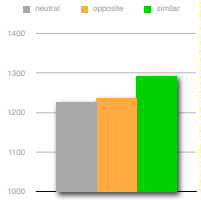
Experiment 2

Aim: ET priming effects with picture stimuli
Participants: 42 native Italian students
Tasks and design: as in Experiment 1
Materials: picture primes instead of word primes

Graphical representations of ETs: STA, ACT, ACC, ACH

Results:

* high accuracy (0.92); 0.94 for DUR, .90 for RES);
* general inhibition effect on decision latencies (neutral prime used as baseline)
* significant effect of target's ET, task, featural value
* separate analyses:
  - effect of similar primes on ACH for DUR and RES



mean decision latencies

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)	
(Intercept)	9.40	9.40	9.31	9.49	0.00	0.00	
primeopp	0.01	0.01	-0.02	0.03	0.68	0.69	
primesim	0.05	0.05	0.03	0.08	0.00	0.00	***
etACT	-0.08	-0.08	-0.14	-0.02	0.01	0.01	**
taskris	0.14	0.14	0.05	0.22	0.00	0.02	*
featval+	-0.05	-0.05	-0.08	-0.03	0.00	0.00	***

Experiment 2, mixed effect model, general analysis:
log(dl) ~ prime + et + task + featval + (1|sub j) + (1|verb) + (1|sem cl)

	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)	
DUR, ACH targets							
(Intercept)	9.38	9.37	9.24	9.53	0.00	0.00	
primeopp	0.02	0.01	-0.04	0.07	0.59	0.55	
primesim	0.08	0.08	0.02	0.13	0.00	0.00	***
DUR, ACT targets							
(Intercept)	9.26	9.26	9.18	9.33	0.00	0.00	
primeopp	0.03	0.03	-0.02	0.08	0.22	0.21	
primesim	0.02	0.02	-0.02	0.07	0.36	0.34	
RES, ACH targets							
(Intercept)	9.52	9.51	9.35	9.68	0.00	0.00	
primeopp	-0.02	-0.02	-0.08	0.03	0.52	0.48	
primesim	0.07	0.07	0.01	0.12	0.01	0.01	*
RES, ACT targets							
(Intercept)	9.46	9.46	9.39	9.53	0.00	0.00	
primeopp	-0.01	-0.01	-0.06	0.04	0.71	0.7	
primesim	0.03	0.03	-0.02	0.09	0.21	0.19	

Experiment 1, mixed effect model, separate analyses: log(dl) ~ prime + (1|sub j) + (1|verb) + (1|sem cl)

Discussion

	DUR		RES	
	ACH	ACT	ACH	ACT
Bonnotte 2008		similar opposite	similar	
Experiment 1	opposite	similar	opposite	
Experiment 2	similar		similar	

* Differences between ETs, not between tasks
* Priming effects also with picture stimuli
* Negative priming with picture stimuli (effort to avoid a stimulus + memory retrieval, Tipper 2001)

* **ACT** more ductile and subject to contextual adaption
* **ACH** more ``inherently'' [-DUR] [+RES].

* ETs ≠ semantic classes
* ETs relevant for the mental lexicon
* ETs not only linguistic categories but also deeper, **more abstract event structures** shared by verbs regardless of other meaning dimensions
* placing ET study within a broader framework of event meaning in cognition

➡ **Embodied Cognition Framework (Evans and Green 2006):** semantic representations not purely amodal, but rather grounded in our senso-rimotor perception
➡ **Two-level theory of verb meaning (Kemmerer and Gonzales-Castillo 2010):** processing a verb involves "covertly recapitulating" the event it refers to

Future Work

* comparison with a similar study of Russian (Batiukova et al. 2010)
* use of videos for a better depiction of DUR and RES

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