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)?

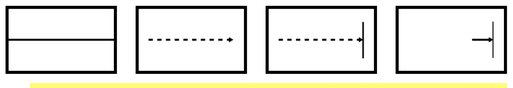
Previous study:

* 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*

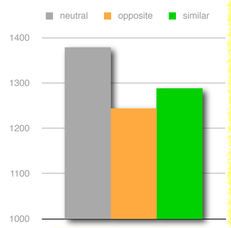
Tasks: answer with Yes/No buttons (right/left hand)

* **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)

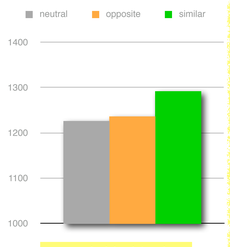
Experiment 2

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

Many thanks to Pier Marco Bertinetto, Laboratorio di Linguistica of the Scuola Normale Superiore in Pisa, Irene Ricci, Valentina Bambini, Berry Claus and Pirita Pyykkönen.

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