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'Not-' Cracker

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An item in a *verification experiment* consists in the presentation of a *category name* followed by an *object*. For instance, the name *dog* could be displayed, followed by the picture of a cat. If the object is not a member of the category–as in the previous example–it is a *false item*; otherwise, it is a *true item*. Participants decide, as fast as possible, whether or not the name and the object match; RTs are recorded. To respond to true and false items, one must possess–in one form or another–representations of categories and of their complementary (e.g., *not-dog*).

Table 1: Mean RTs (ms) and SLIP's predictions for Murphy and Smith's (1982), Murphy's (1991), Tanaka and Taylor's (1992), and Gosselin and Schyns' (1998) experiments.

			Level		
Source	Item		Low-	Mid-	High-
Murphy & Smith. Exp. 1	True	Obs.	723	678	879
		SLIP	1.522	1.120	1.522
	False	Obs.	691	714	882
		SLIP	3.269	1.861	3.269
Murphy & Smith. Exp. 3. Size	True	Obs.	574	882	666
		SLIP	1.120	1.522	1.522
	False	Obs.	600	824	741
		SLIP	1.861	3.269	3.269
Murphy. Exp. 3	True	Obs.	776	688	779
		SLIP	1.522	1.120	1.522
	False	Obs.	735	728	854
		SLIP	3.269	1.861	3.269
Murphy. Exp. 4. Simple	True	Obs.	862	811	980
		SLIP	1.522	1.120	1.522
	False	Obs.	949	792	983
		SLIP	3.269	1.861	3.269
Murphy. Exp. 4. Enhanced	True	Obs.	1.132	854	955
		SLIP	1.556	1.102	1.556
	False	Obs.	1.000	806	875
		SLIP	3.536	1.540	3.536
Murphy. Exp. 5	True	Obs.	1.072	881	854
		SLIP	1.566	1.319	1.266
	False	Obs.	961	827	914
		SLIP	3.624	2.576	2.161
Tanaka & Taylor. Novice	True	Obs.	778	678	746
		SLIP	1.483	1.291	1.345
	False	Obs.	855	734	802
		SLIP	3.016	2.339	2.868
Tanaka & Taylor. Expert	True	Obs.	622	623	729
		SLIP	1.325	1.325	1.348
	False	Obs.	730	783	772
		SLIP	2.639	2.639	2.910
Gosselin & Schyns. Overall	True	Obs.	1.184	1.012	819
		SLIP	4.000	2.667	1.333
	False	Obs.	1.105	1.011	824
		SLIP	3.583	3.226	2.727

True items' RTs have been used, almost exclusively, to test models of *basic-levelness* (see Gosselin & Schyns, 1997, for a review); false items' RTs have received no theoretical attention, although a quick inspection of the results of classical basic-level experiments (see Table 1) reveals a high correlation between true and false items' RTs (r=.91, p<.0001). This makes of false items' RTs as good a predictor of basic-levelness as any other.

We attempt here to explain this correlation within SLIP's (Strategies Length & Internal Prolixity) framework (Gosselin & Schyns, 1997). In SLIP, a classifier with a slippery attention works its way through the shortest strategy required for a given verification trial by trial. If he fails to complete a verification after t trials ($t \geq$strategy length), either the item is false, or the categorizer's attention has so far slipped on irrelevant features for the task at hand. In SLIP, we can compute the likelihood of the latest possibility because we know the density function of the number of trials necessary to complete any strategy. Working backwards, a classifier could conclude that an item is false having reached *t_stop* trials, the point beyond which the probability that the item is true is smaller than some costant λ. (This accounts for true items' error rates *en passant.*) For length 1 strategies, *t_stop* is especially simple to calculate:

$$\frac{\log \lambda}{\log(P - PQ)}$$

where P is the probability of a slip; and where Q is the probability that one diagnostic test is performed by chance alone.

Table 1 shows SLIP's predictions (with P=.5 and λ=.05). The correlation between these predictions (linearly adjusted within each experiment) and the data is .84 (p<.0001). For length 1 strategies (all experiments except Gosselin & Schyns' where strategy length becomes a factor of the design), SLIP predicts the observed correlation between the RTs of true and false items; Furthermore, it predicts that false items should be verified slower than true items. For Gosselin & Schyns' (1998) mid- and low- levels categories (which have strategy lengths of 2 and 3, respectively), SLIP correctly predicts that false items' RTs decrease relative to true iems as the length of the strategy increases, and that false items are verified faster than true items at the lower categorization level. (This occurs because length n strategies require n diagnostic tests, each one of which can reveal a false item.)

We believe SLIP is a powerful formal plateform to study the hierarchical levels of object categorization.

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