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When Exactly do Dealers Deal more than Corners Corn? Incremental Masked Priming and Morpho - Orthographic Effects

Background

It has long been known that complex words such as 'dealer' are broken down into their constituent morphemes, 'deal' and 'er', during visual word identification (e.g. Taft & Foster, 1976).

There is evidence that the same happens to pseudo-derived words like 'corner' ('corn' + 'er'): several studies have shown that corner-CORN yields more facilitation than an orthographic control, just as much as dealer-DEAL does (e.g., Rastle et al.2004).

There is also evidence, however, that dealer-DEAL yields more facilitation than corner-CORN (e.g., Diependaele et al. 2011; Feldman et al., 2009).

In sum, evidence from classical masked priming experiments isn't completely uncontroversial.

We thus addressed the issue of morpho-orthographic priming with a different paradigm, i.e., **incremental masked priming:** the same (related) prime-target pairs are shown at different SOAs, the shortest one being taken as the baseline.
Advantage 1: no unrelated primes, i.e., there is no risk of the effect being due to inhibition from control primes.
Advantage 2: different SOAs tested with the same participants and materials, i.e., we can track finer-grained temporal effects.

Research Questions

Do transparent and opaque pairs yield equivalent facilitation?

If not, at which SOAs do the effects diverge?

Materials & Methods

- 208 participants, all Italian skilled readers;

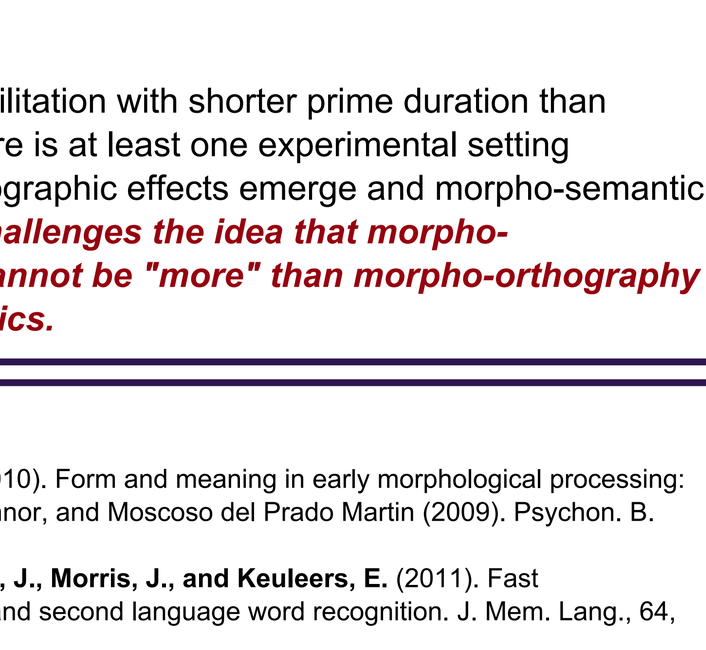
- 285 prime-target pairs, 95 in each of three conditions: Transparent (artista-ARTE, artist-ART), Opaque (retaggio-RETE, legacy-NET), Form (corallo-CORO, coral-CHOIR);

- The set includes both proper (pseudo-) derivations (e.g., occhiata-OCCHIO, glance-EYE) and evaluative (pseudo-) derivations (e.g., borsetta-BORSA, lit. little bag-BAG);

- 5 SOA condition: 11.8 ms, 23.5 ms, 35.3 ms, 47.1 ms, and 58.8 ms (i.e. 1, 2, 3, 4, 5 refresh cycles of a 85 Hz computer screen);

- Latin-square design with five rotations: each participant was tested in each condition, but saw each target only once;

- Data analysed through mixed effect models. Several covariates taken into consideration, including trial-series effects (e.g., trial position in the randomised list, RT on the preceding trial) and target word effects (e.g., frequency, N).



Results

Main analysis:

- Effects of condition ($F[2, 27697] = 26.35$, $p < .001$), SOA ($F[4, 27697] = 16.15$, $p < .001$), and condition-by-SOA ($F[8, 27697] = 5.87$, $p < .001$);
- No higher-level interaction with any covariate, including evaluative vs. proper derivations.

	SOA				
Condition	11.8 ms	23.5 ms	35.3 ms	47.1 ms	58.8 ms
Orthographic	624	623	621	628	625
	0.06	0.06	0.05	0.05	0.05
Opaque	609	613	598	604	597
	0.04	0.03	0.04	0.03	0.03
Transparent	579	581	578	565	560
	0.02	0.02	0.01	0.01	0.01

SOA effect in each individual condition:
- No effect in the orthographic condition ($F[4, 9079] = 0.61$, $p = .72$);
- Significant effect in the opaque condition ($F[4, 9079] = 9.3$, $p < .001$):
RTs get faster than in the 11.8 ms SOA baseline at 35.3 ms of SOA (Beta = 0.019, estimated effect = -6.9 ms, $p = .03$);
- Significant effect in the transparent condition ($F[4, 9079] = 26.31$, $p < .001$):
RTs get faster than in the 11.8 ms SOA baseline at 47.1 ms of SOA (Beta = -0.039, estimated effect = -12.5 ms, $p = <.001$);
- **When assessed against a neutral baseline, opaque priming emerges at a shorter SOA than transparent priming.**

Opaque vs. transparent priming:
- dealer-DEAL doesn't yield more priming than corner-CORN at 23.5 ms (Beta = -0.011, estimated effect = -3.8 ms, $p = .35$), 35.3 ms (Beta = 0.012, estimated effect = 4.2 ms, $p = .3$), and 47.1 ms (Beta = -0.018, estimated effect=-6.2 ms, $p = .12$);
- dealer-DEAL does yield more priming than corner-CORN at 58.8 ms of SOA (Beta = -0.03, estimated effect = -10.2 ms, $p = .01$).

Discussion

When contrasted with each other **with no unrelated control primes**, transparent priming is significantly larger than opaque priming at the 58.8 ms SOA.
At the 47.1 ms SOA there is a 6.2 ms trend towards more priming for dealer-DEAL than corner-CORN; but this is only a trend, in line with suggestions from previous meta-analyses (e.g., Davis & Rastle, 2010).

Opaque pairs yield facilitation with shorter prime duration than transparent pairs. There is at least one experimental setting whereby morpho-orthographic effects emerge and morpho-semantic effects do not. ***This challenges the idea that morpho-orthography alone cannot be "more" than morpho-orthography plus morpho-semantics.***

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