

# The Tell-Tale Eye

## Fixation Times Indicate Morpho-Semantic Effects in Masked Priming

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# Masked priming

- An experimental paradigm in which prime words are presented very briefly (40 ms) between a mask and target words
- A *lexical decision* is usually asked, and response times are measured
- Used to investigate early phases of lexical access
- In morphological processing, derived words and their roots are used as prime–target pairs

# The morpho-orthographic level

- Rastle et al. (2004) studied the effect of semantic transparency
  - significant priming effect for transparent words (DEALER-deal)
  - significant priming effect for opaque words (CORNER-corn)
  - no priming effect for orthographic control words (BROTHEL-broth)
  
- A processing level in which words are decomposed solely on the basis of their *orthographic parsability*, irrespective of their semantic properties

# Task effects

- Masked priming is very sensitive to task manipulations
- The morpho-orthographic pattern is not found when a same-different task is used in place of lexical decision (Duñabeitia et al. 2011)
  - significant priming effect for transparent words (DEALER-deal)
  - significant priming effect for opaque words (CORNER-corn)
  - significant priming effect for orthographic control words (BROTHEL-broth)
- Lexical access is *not required* in this task
- Uninformative as to how morpho-orthographic segmentation serves word identification

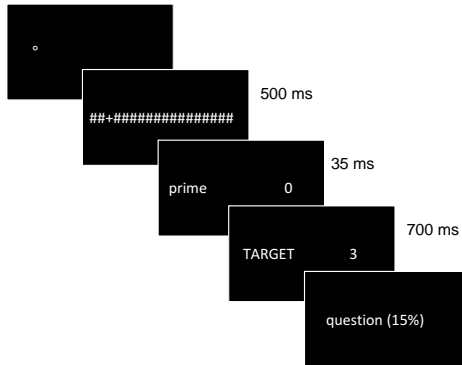
# Aim of the study

- Testing morpho-orthographic effects in tasks requiring lexical access (but moving away from lexical decision)
  - masked priming paradigm
  - semantic decision task
  - fixation time data

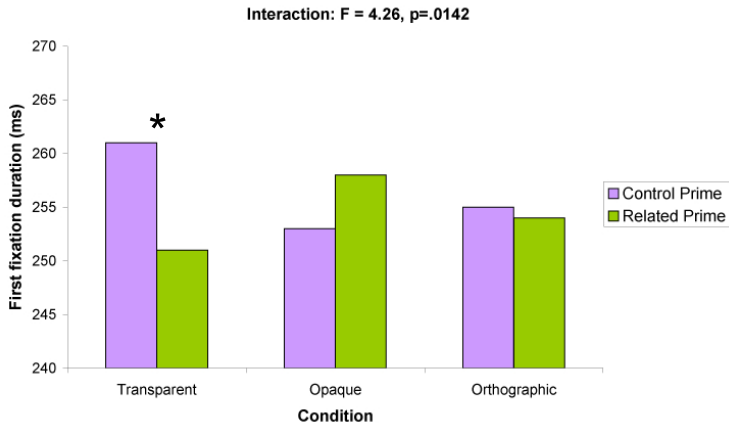
# Materials and methods

- **Participants:**  
27 Italian students from the University of Milano-Bicocca
- **Materials:**  
150 prime-target pairs (compared to target preceded by unrelated primes)
  - 50 transparent: *artista-ARTE*, artist-ART
  - 50 opaque: *retaggio-RETE*, legacy-NET
  - 50 orthographic: *corallo-CORO*, coral-CHOIR
- **Apparatus:**  
EyeLink 1000 eye-tracker
- **Dependent measures:**  
First fixation durations  
Gaze durations

# Procedures

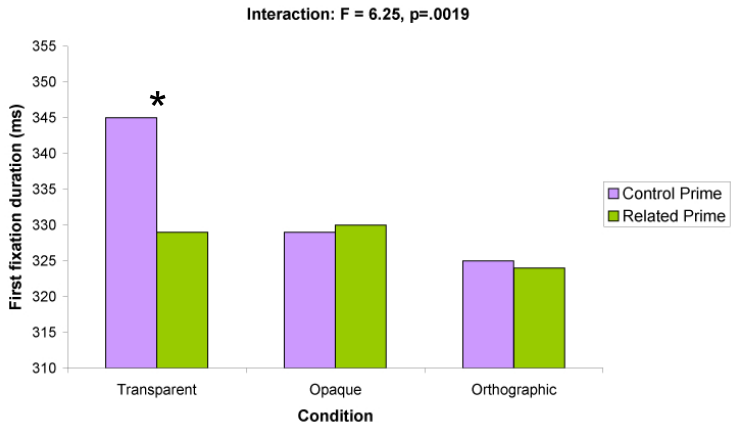


# Results - first fixation durations





# Results - gaze durations



# Discussion

- By changing the task, the traditional morpho-orthographic effect does not emerge in masked priming
- A *morpho-semantic effect* is found as early as the first fixation on the word
- Morpho-orthographic segmentation is not always necessary to achieve lexical identification

# Control experiment

- Morpho-orthographic effects have been never found in Italian
- Ruling out language-specific effects in a traditional masked priming experiment
- The same material used in the first experiment was employed
- A lexical decision was asked, and latencies of behavioral responses were collected
- The morpho-orthographic pattern was found, with significant priming effects in both transparent and opaque conditions
- This excludes that the results of Experiment 1 were due to some peculiar features of Italian, or of these specific items.

# Conclusions

- It is possible to set task requirements so that morpho-orthographic effects do not emerge in a masked priming environment
- Morpho-orthographic segmentation is *not necessary* for lexical access

# Conclusions

- The morpho-orthographic level should not be implemented as an obligatory step in word-access models, but rather as a mechanism activated only in specific contexts (in which word meaning is not crucial?)
- Flexible architectures (Norris and Kinoshita, 2008) are arguably preferable in order to explain these contextual effects

THANK YOU  
FOR YOUR ATTENTION

## Results - first fixation durations

	Transparent		Opaque		Form	
	mean	SEM	mean	SEM	mean	SEM
Control prime	261	1.18	253	1.11	255	1.14
Related prime	251	1.03	258	1.16	254	1.19

## Results - first fixation durations

Fixed Effect	Estimate	Std. Error	t value	pMCMC
Intercept	259.86	9.93	26.18	.0001
Related	.55	3.18	.17	.8668
Cond:Opaque	1.37	3.51	.39	.6984
Cond:Transparent	9.29	3.56	2.61	.0074
Related*Cond:Opaque	2.66	4.44	.61	.5514
Related*Cond:Transparent	-9.61	4.44	2.16	.0321
Target length	3.76	1.46	2.58	.0086
Trial number	.05	.02	2.38	.0208



## Results - gaze durations

	Transparent		Opaque		Form	
	mean	SEM	mean	SEM	mean	SEM
Control prime	345	1.45	329	1.36	325	1.41
Related prime	329	1.36	330	1.36	324	1.48

## Results - gaze durations

Fixed Effect	Estimate	Std. Error	t value	pMCMC
Intercept	263.14	13.99	18.81	.0001
Related	1.16	3.34	.35	.7328
Cond:Opaque	-3.12	3.74	.83	.4028
Cond:Transparent	5.89	3.88	1.52	.1202
Related*Cond:Opaque	-3.82	4.66	.82	.4224
Related*Cond:Transparent	-15.79	4.66	3.38	.0006
Prime length	3.51	1.21	2.89	.0034
Target length	11.28	1.79	6.31	.0001
Target <i>N</i>	-.98	.36	2.72	.0048
Target frequency	0.10	1.70	0.06	0.954

## Results - RTs

	Transparent		Opaque		Form	
	mean	SEM	mean	SEM	mean	SEM
Control prime	613	1.63	637	1.69	642	1.81
Related prime	575	1.49	620	1.82	641	1.93

## Results - RTs

Fixed Effect	Estimate	Std. Error	t value	pMCMC
Intercept	-1.48	.03	46.52	.0001
Related	-.02	.01	1.68	.0956
Cond:Opaque	-.01	.02	.63	.5038
Cond:Transparent	-.04	.02	2.11	.0304
Related*Cond:Opaque	-.05	.01	3.47	.0002
Related*Cond:Transparent	-.11	.01	7.94	.0001
Target <i>N</i>	-.01	.01	1.88	.0502
Target frequency	-.08	.01	8.24	.0001