



LA FLUENCE : UN INDICE MÉTACOGNITIF POUR NOS JUGEMENTS



ARC "Affect, Decision-Making and Social
Regulation"
22.03.2010

Fluency Feeling

- **La facilité de traitement** d'un stimulus est caractérisée par des paramètres non intrinsèques au stimulus lui-même...
- // à la précision, la vitesse ou encore le coût en ressources de traitement du stimulus.
- **Le sentiment de "fluence"** = expérience phénoménologique accompagnant cette facilité....
- Initialement exploré à l'aide du paradigme de répétition ... => sentiment de fluence accompagnant une **facilité de traitement perceptif**

Perceptual Fluency



Rôle bien établi dans certains jugements :

- Jugement de reconnaissance
- Jugement de préférence



FLUENCY & MEMORY



The Case of Recognition

Perceptual Fluency & Recognition



WHAT IS REMEMBERING?

Direct Access to the PAST?

OR

An Interpretation based on the PRESENT?

Perceptual Fluency & Recognition

Evidence for a Relationship between Perception and Recognition

Jacoby and Dallas (1981)

- Participants studied a list of words
- Performed a Tachistoscopic Identification Test
- Followed by a Recognition Test

Perceptual Fluency & Recognition



Tachistoscopic Identification

Perceptual Fluency & Recognition



Tachistoscopic Identification

Table

Perceptual Fluency & Recognition

Tachistoscopic Identification

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Perceptual Fluency & Recognition



Tachistoscopic Identification

Quel était le mot ?

Perceptual Fluency & Recognition





Recognition judgment

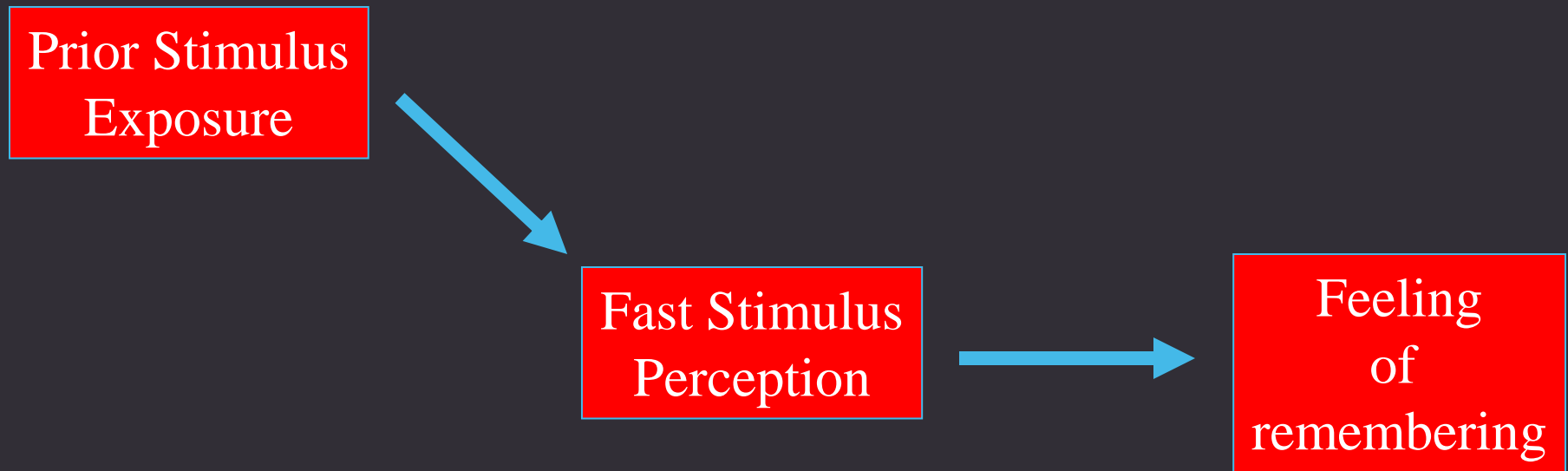
Avez vous vu ce mot avant ?

Perceptual Fluency & Recognition

Results:

- “Old” words more likely to be identified in the T-scope test (prior exposure  ease of perception)
- Words identified in the T-scope test more likely to be judged “old” in the recognition test
(ease of perception  recognition)

Perceptual Fluency & Recognition



Perceptual Fluency & Recognition

Toute variable intervenant à différentes étapes du traitement perceptif et permettant d'augmenter la vitesse et la précision de l'identification devrait donc influencer la reconnaissance

- **Simple répétition** (amorçage par répétition),
- **Mais aussi qualité perceptive** (contraste figure/fond, netteté, niveau sonore, durée de présentation, la taille, distinctivité des lettres, ...)
- **fréquence** lexicale, phonotactique,
- etc

Fausse reconnaissance: Amorçage perceptif

CANARD

#####

CANARD

« Oui, vu avant »

BATEAU

#####

CANARD

« Non, jamais vu »

Jacoby et Whitehouse (1989)

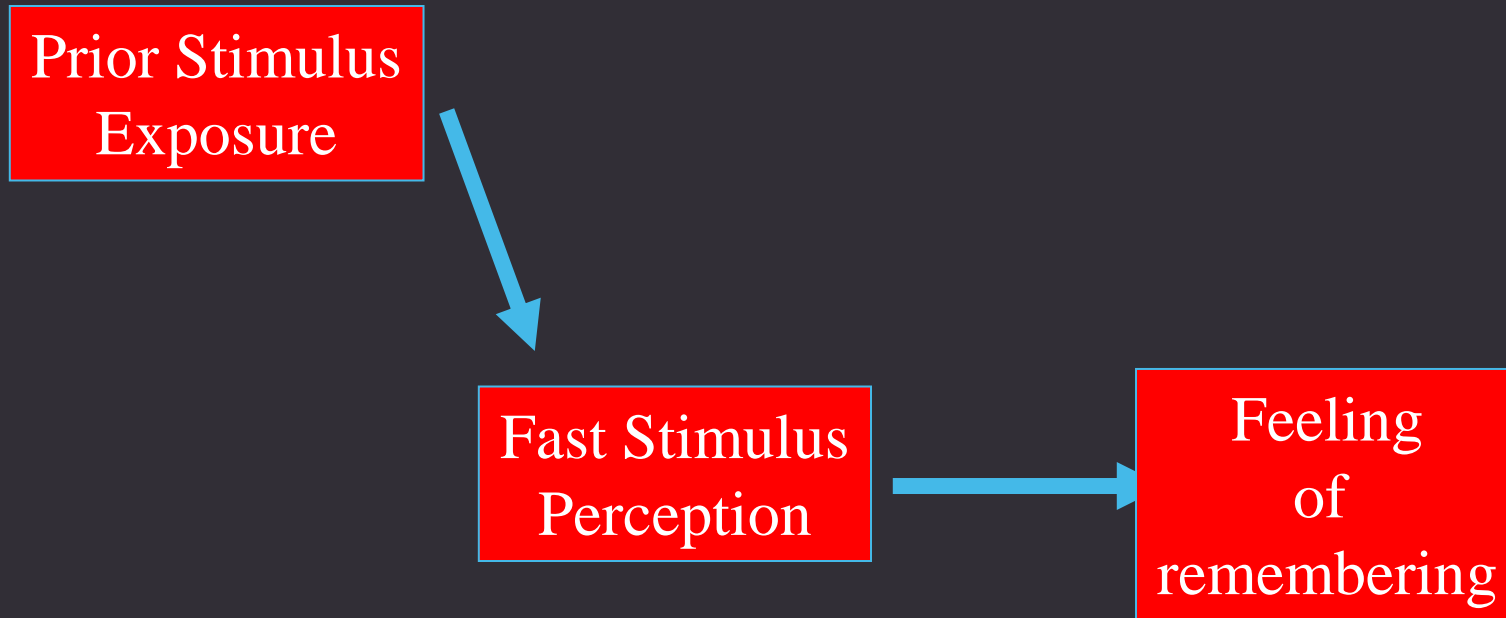
Fausse reconnaissance: Qualité perceptive



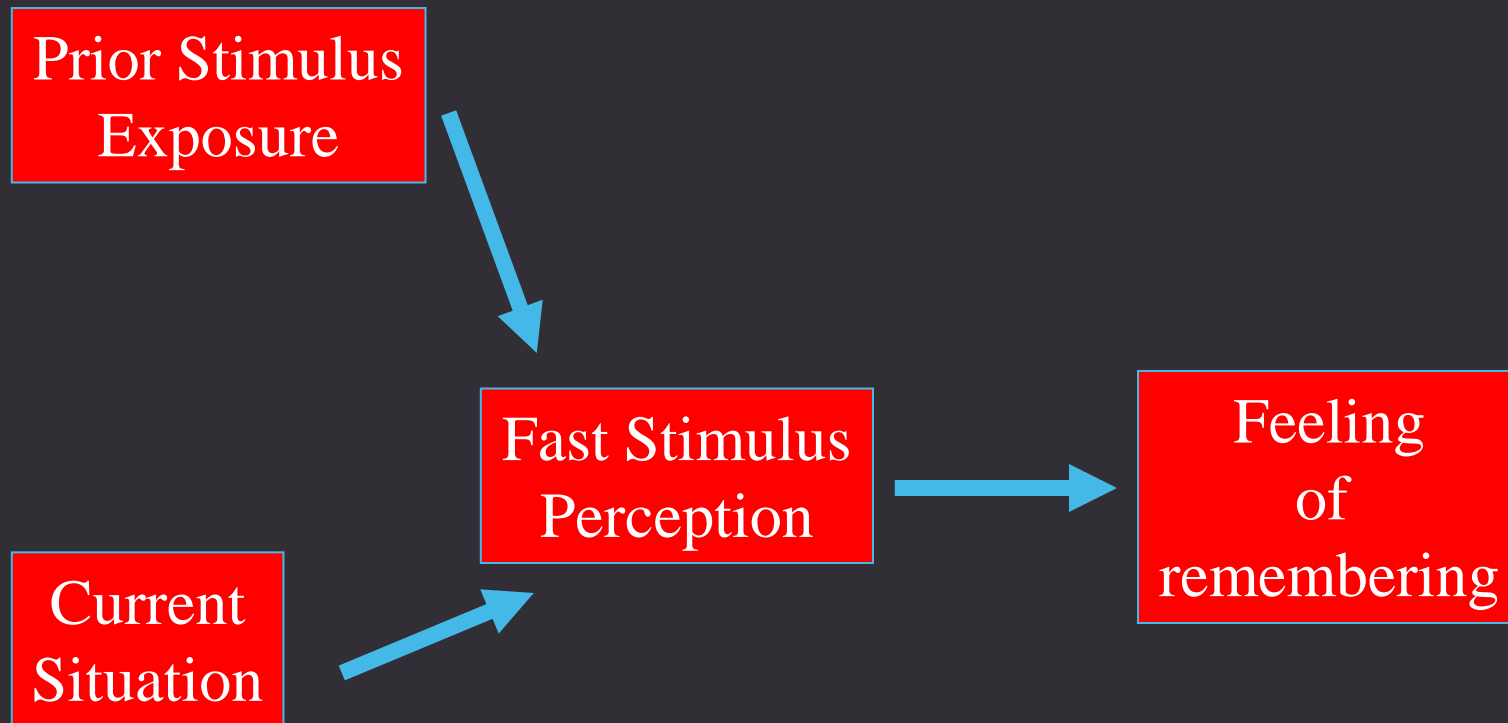
Fausse reconnaissance: prototypie, symétrie



Perceptual Fluency & Recognition



Perceptual Fluency & Recognition



**Present Circumstances
Contaminate Thoughts about the Past**

Processing Fluency



- Le sentiment de fluence peut refléter des processus à différents niveaux du traitement d'une information
- facilité perceptive vs facilité conceptuelle

Conceptual fluency



Processus impliqués dans la catégorisation ou le traitement de la signification du stimulus.

- **Présentation d'une amorce sémantique** (amorçage sémantique à court terme)
- **Contexte rendant l'information prédictive, etc.**

Conceptual Fluency

Whittlesea (1993)

▣ Study Phase

- Participants studied a list of words

▣ Test Phase

- “Old” and “New” words presented at the end of either “**predictive**” or “**non-predictive**” sentences
- Participants asked to make Old/New Judgements

Conceptual Fluency



Predictive Sentence

L'alpiniste arrive au sommet de la MONTAGNE

Non-Predictive Sentence

Elle rêve de passer des vacances à la MONTAGNE

Conceptual Fluency



Predictive Sentence

L'alpiniste arrive au sommet de la MONTAGNE

Non-Predictive Sentence

Elle rêve de passer des vacances à la MER

Conceptual Fluency



Predictive Sentence

L'alpiniste arrive au sommet de la MONTAGNE

Non-Predictive Sentence

Elle rêve de passer des vacances à la CAMPAGNE

Conceptual Fluency



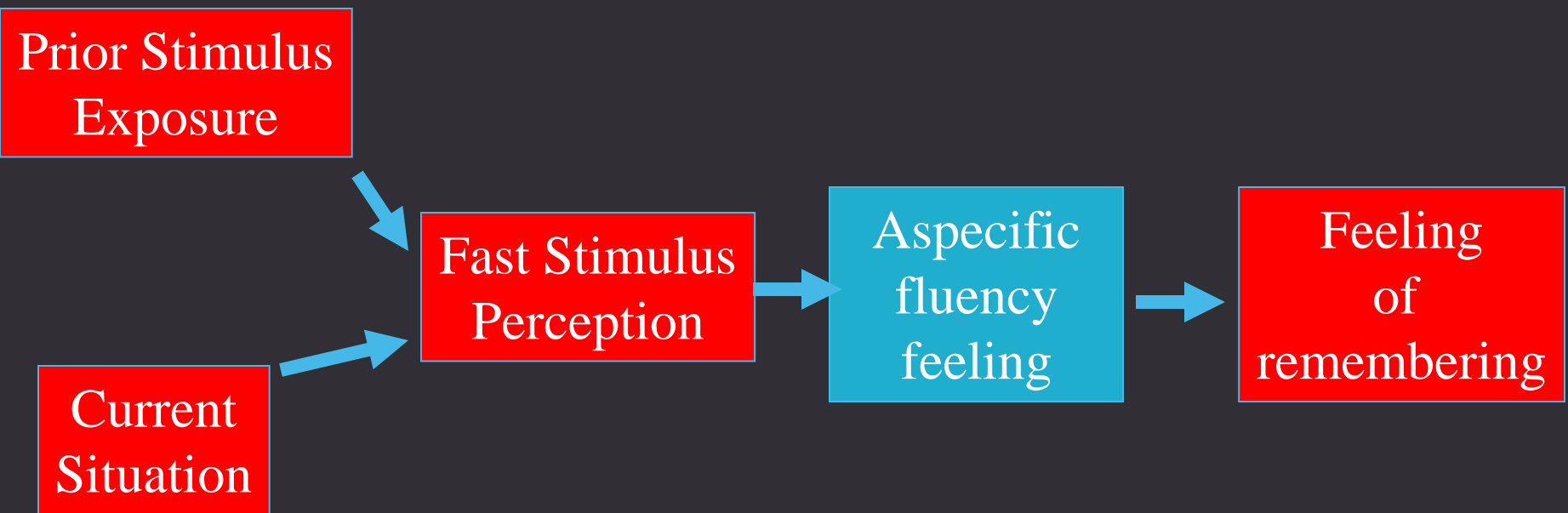
- Whittlesea (1993)
 - Results:
 - Both “Old” and “New” Words **perceived faster** in predictive than in non-predictive sentences

Conceptual Fluency

Probability of Judging Words “Old”:

| | Old Words | New words |
|-------------------------|-----------|-----------|
| Predictive Sentence | .52 | .40 |
| Non-Predictive Sentence | .41 | .22 |

Fluency & Recognition



Fluency & Recognition



Dual-Process Theory

Two ways people “recognize” a stimulus as “Old” :

1. **Feeling of Familiarity**
2. **Memory Search and Retrieval**
(Recollection of Context)

(Atkinson and Juola, 1977)

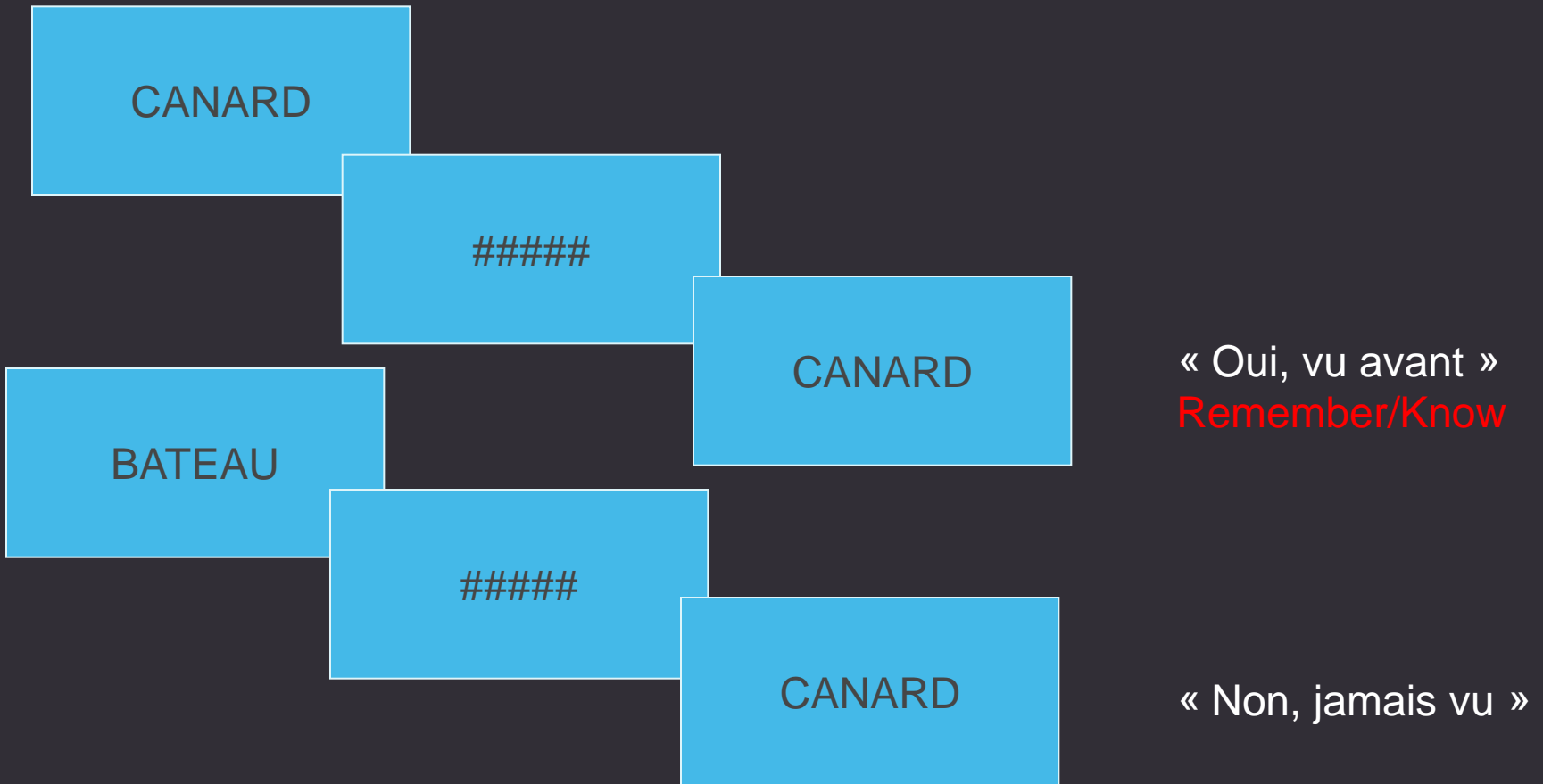


FLUENCY & RECOGNITION



The Case of Familiarity

Perceptual Fluency & Familiarity



« Oui, vu avant »
Remember/Know

« Non, jamais vu »

Rajaram (1993)

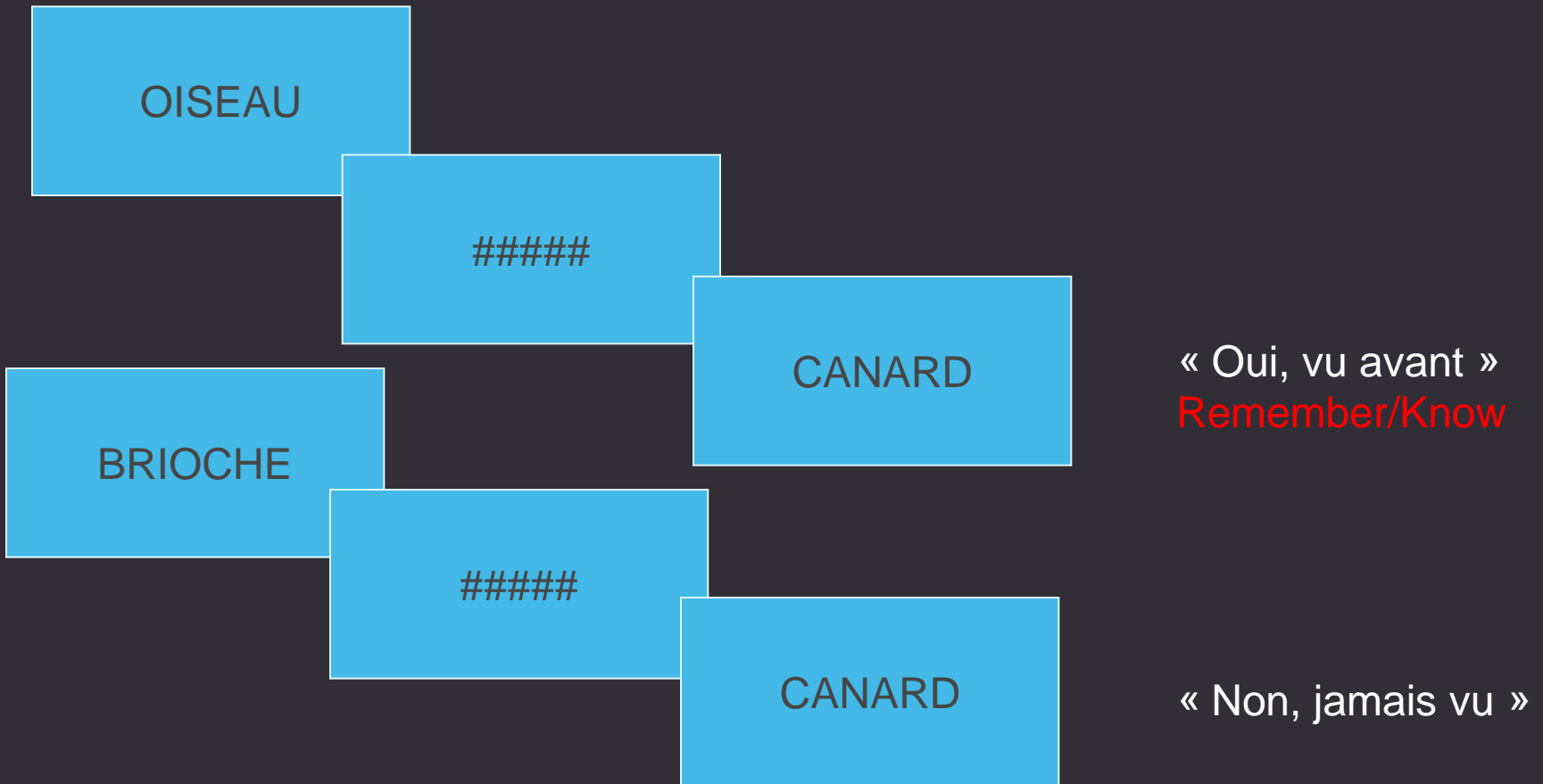
Perceptual Fluency & Familiarity

**Design and Results for Proportion of Hits and False Alarms (FA)
and the RT Data (in Milliseconds) in Experiment 3**

Study items (targets)—table, plate:

| | Targets | | Lures | |
|----------------------|-------------------|-----------------|-------------------|-----------------|
| | Masked Repetition | Unrelated Prime | Masked Repetition | Unrelated Prime |
| Mask | &&&&& | &&&&& | &&&&& | &&&&& |
| Prime | table | scale | glass | chalk |
| Test Word | TABLE | PLATE | GLASS | SHIRT |
| Response Required | “Yes” | “Yes” | “No” | “No” |
| RT Data | 1,296 | 1,275 | 1,354 | 1,293 |
| Recognition | “Yes” | “Yes” | “Yes” (FA) | “Yes” (FA) |
| | .67 | .60 | .23 | .18 |
| “Remember” Responses | .43 | .42 | .05 | .05 |
| “Know” Responses | .24 | .18 | .18 | .13 |

Conceptual Fluency & Familiarity



Perceptual Fluency & Familiarity

Response Proportions for Remember and Know Responses to Studied and Nonstudied Targets as a Function of Prime Relation

| Prime relation | Conditions | | | |
|----------------|----------------|--------------|----------------|---------------|
| | Studied | | Nonstudied | |
| | Related | Unrelated | Related | Unrelated |
| Prime Target | sugar SWEET | fruit INK | author BOOK | delay TREE |
| Recognition | .70 | .67 | .16 | .10 |
| Remember | .41 | .43 | .04 | .03 |
| Know | .30 | .24 | .13 | .07 |

Fluency Feeling & Familiarity

- within the domain of recognition, only familiarity judgments, and not recollection judgments, are ubiquitously thought to be the product of inferences influenced by fluency (Kelly & Jacoby, 2000), as indicated with the use of Remember-Know procedure (Rajaram & Geraci, 2000; Willems et al., 2006, 2007).



PAST INFLUENCES ON PRESENT JUDGMENT



The Case of Preference, Clarity, Truth, and Fame

Fluency & illusion of Clarity

- Jacoby, Allan, Collins, and Larwill (1988)
 - Study Phase:
 - Participants listened to a list of sentences through headphones
 - Test Phase:
 - Participants listened to “old” and “new” sentences against a background of noise
 - Were asked to rate the level of noise for each sentence

Fluency & illusion of Clarity

Average Noise Ratings:

| | Old Sentences | New Sentences |
|--------------|---------------|---------------|
| Low Noise | 1.9 | 2.1 |
| Medium Noise | 2.5 | 3.0 |
| High Noise | 3.3 | 3.7 |

Fluency & Illusion of Truth

- Begg and Armour (1988)
 - Study Phase:
 - Participants read a list of statements
 - Biased Positive:
 - Almost everybody knows that
 - Biased Negative:
 - Few people would believe that

Fluency & Illusion of Truth



- Begg and Armour (1988)
 - Test Phase:
 - Participants read “old” and “new” unbiased statements and rate them for “TRUTH”

Fluency & Illusion of Truth

Average “Truth” Ratings:
(7 is True, 1 is False)

Old Sentences
(Positive)

3.9

Old Sentences
(Negative)

3.6

New Sentences

3.2

Fluency & Illusion of Fame



- Jacoby, Kelley, et al. (1989)
 - Study Phase:
 - People study a list of non-famous names
 - e.g., Sebastian Weisdorf

Fluency & Illusion of Fame



- Jacoby, Kelley, et al. (1989)
 - Test Phase:
 - People presented with famous names, “old” non-famous names, and “new” non-famous names
 - Asked to rate the level of “fame” of each of the names

Fluency & Illusion of Fame



Results:

People rated “old” non-famous names as more famous than “new” non-famous names.

The Use of Fluency May Be Accurate, But May Also Lead to Error

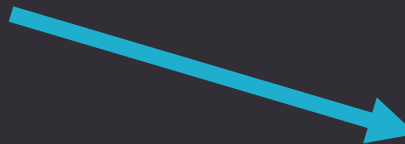
True Origin of
Fluent Perception

Prior Stimulus
Exposure

Accurate



Inaccurate



Source
Attribution

Familiarity

Current
Situation

Aspecific fluency feeling

The Use of Fluency May Be Accurate, But May Also Lead to Error

True Origin of
Fluent Perception

Prior Stimulus
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Source
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Familiarity


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Accurate

Aspecific fluency feeling

Fluency & Preference



The more familiar we are with something, the more we like it. This is the mere exposure effect.

(Zajonc, 1968)

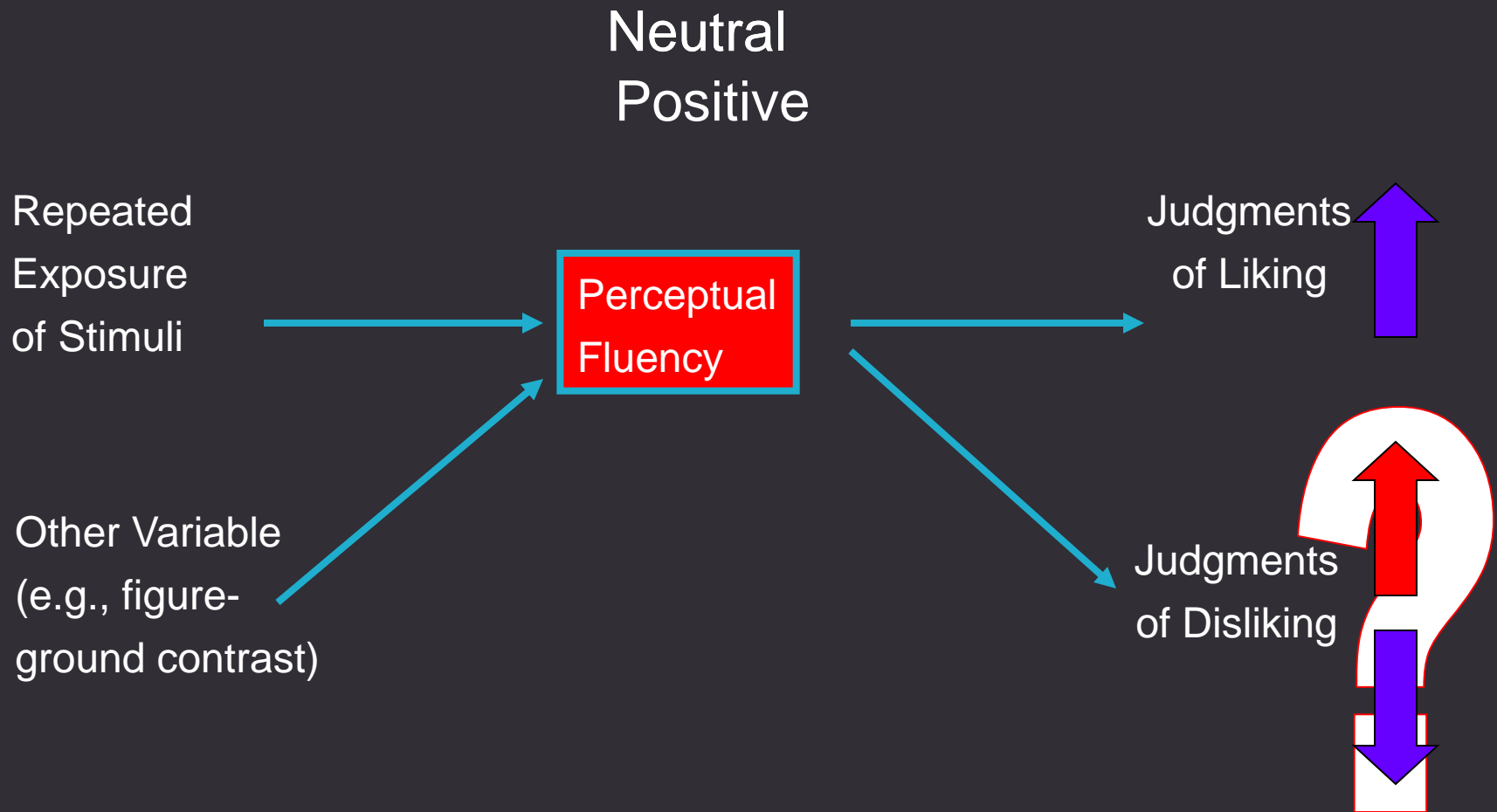
Fluency & Preference

The study of Reber et al. (1998):

Several studies found effects of repeated stimulus exposure on affective preference (Kunst-Wilson & Zajonc, 1980; Zajonc, 1968).

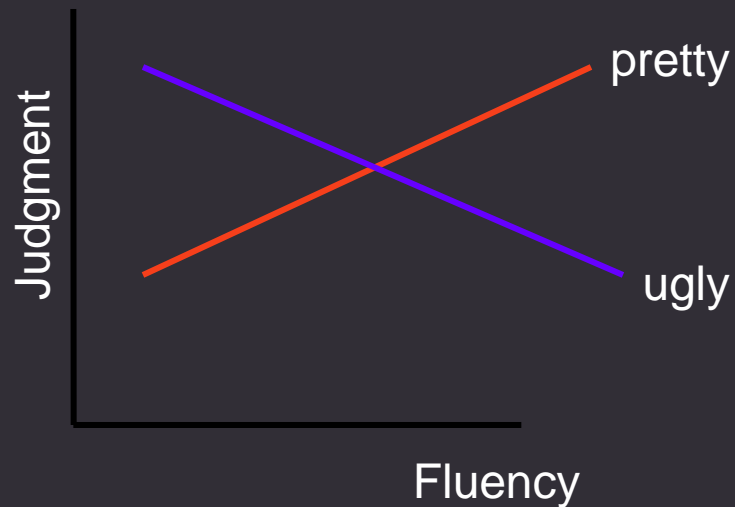
One theoretical account (Bornstein & D'Agostino, 1994) claimed that the link between mere exposure and affect is mediated by perceptual fluency

Fluency & Preference



Fluency & Preference

Perceptual fluency is positive
—> slope positive when question
focus positive and negative when
question focus negative



Fluency & Preference

The authors concluded from this and other experiments that perceptual fluency influences affect. This bolsters a perceptual fluency account of the mere exposure effect on affect (Bornstein & D'Agostino, 1994; Reber & Schwarz, 2001; Whittlesea, 1993).

Winkielman and Cacioppo (2001) could replicate the results by Reber et al. (1998) and found physiological evidence for the fluency → affect-link.

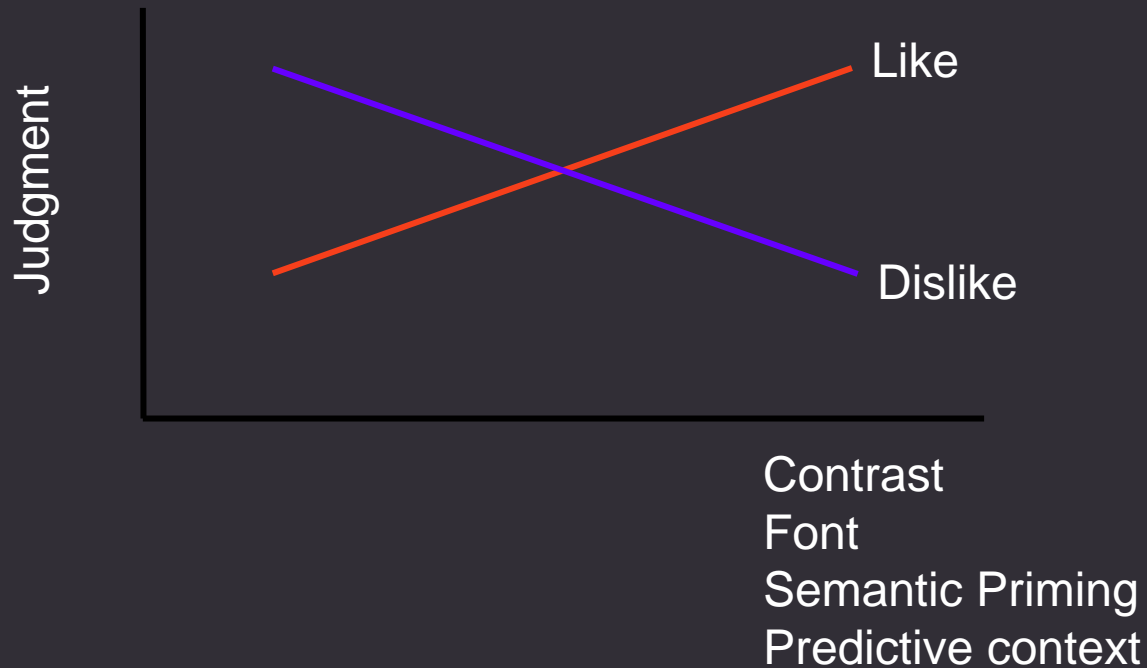
Fluency & Preference



Processing fluency is itself hedonically marked and high fluency is subjectively experienced as positive ([Reber et al., 1998](#)), as indicated by psychophysiological findings ([Winkielman & Cacioppo, 2001](#)).

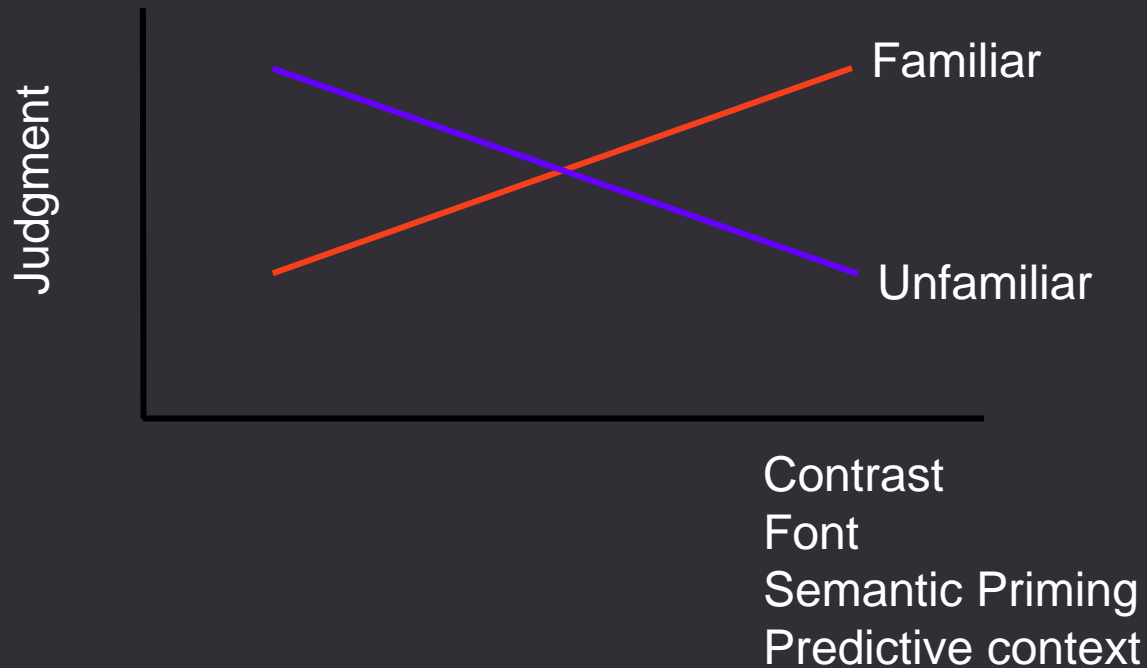
Fluency

Processing fluency is positive
—> slope positive when question
focus positive and negative when
question focus negative



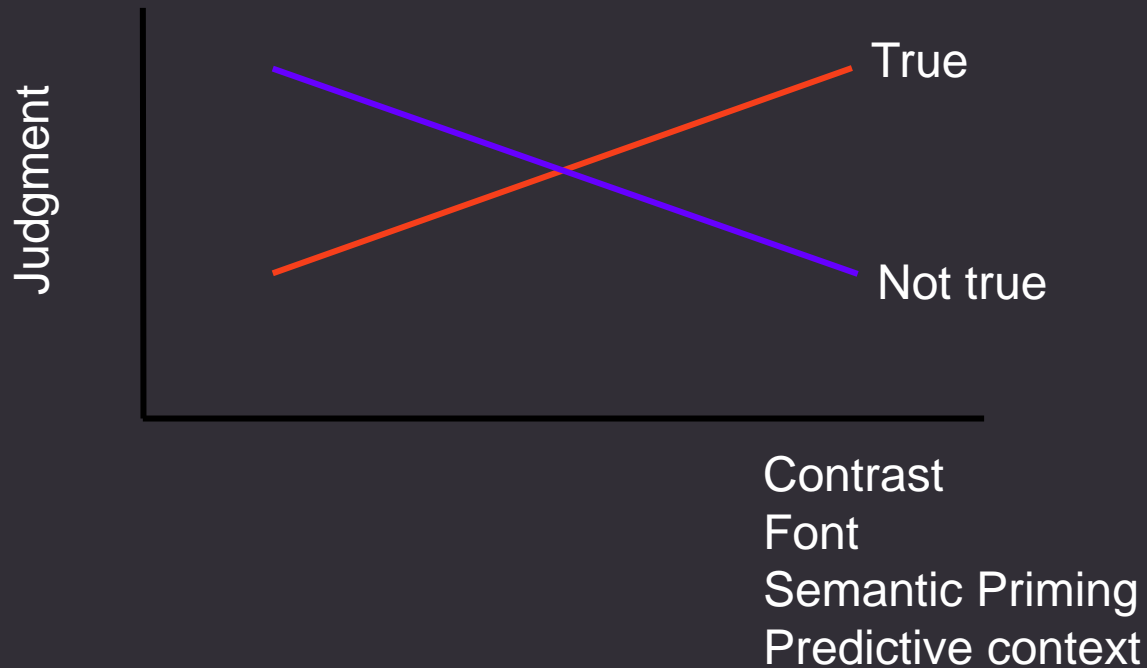
Fluency

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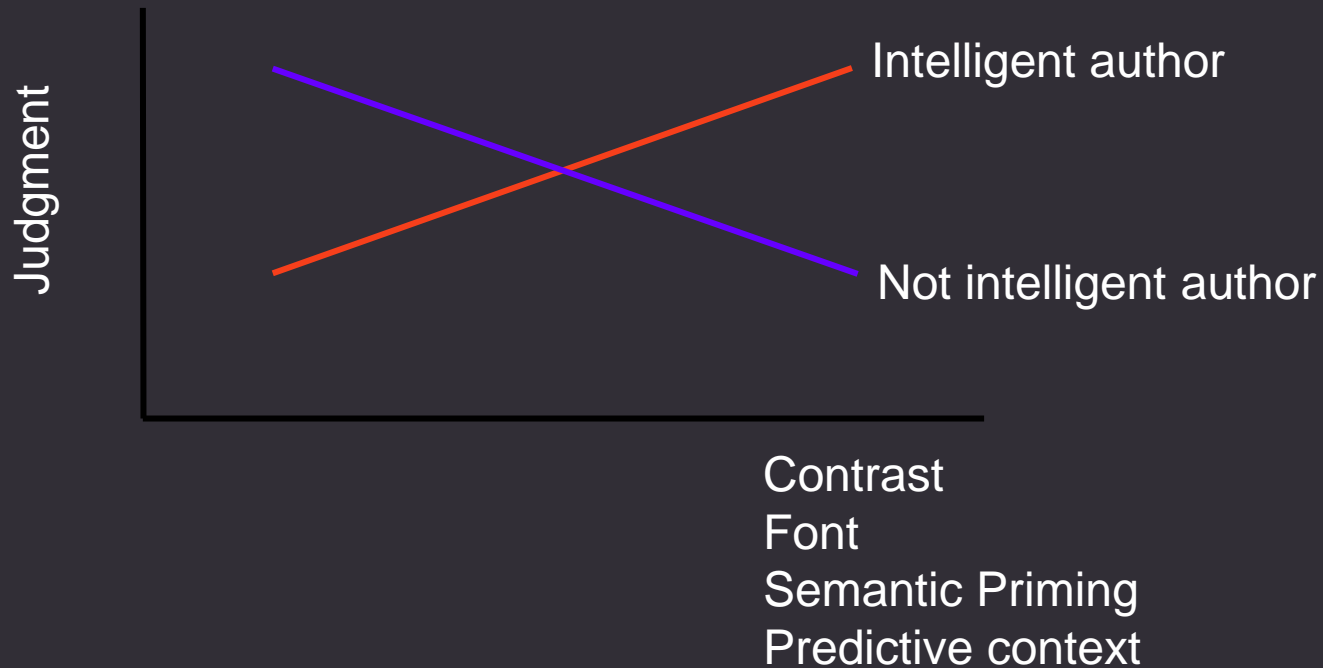
Fluency

Perceptual fluency is positive
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Fluency

Perceptual fluency is positive
—> slope positive when question
focus positive and negative when
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Conclusion:



If it's easy,

**it's familiar, intelligent, typical,
pretty, good, long, fame, true,**

.....

TABLE 1: Catalogue of Fluency Research Showing That Different Instantiations of Fluency Influence Various Judgments and Decisions in a Consistent Manner

| <i>Research Article</i> | <i>Judgment Domain</i> | <i>Fluency Manipulation</i> | <i>Basic Finding</i> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reber & Schwarz (1999) McGlone & Tofiqbakhsh (2000) Brennan & Williams (1995) Begg, Anas, & Farinacci (1992) Kelley & Lindsay (1993) | Truth | Visual ease Linguistic (rhyming) Linguistic (prosody) Retrieval ease Semantic priming | Fluent statements seem truer than disfluent statements. Rhyming aphorisms seem truer than nonrhyming aphorisms. Absence of disfluent speech markers like “uh” or “um” implies truth. Easily retrieved propositions are rated truer than obscured propositions. Semantically primed words seem to be better responses to trivia questions. |
| Bornstein & D’Agostino (1992); Zajonc (1968) Reber, Winkielman, & Schwarz (1998) Winkielman & Cacioppo (2001) Stepper & Strack (1993); Tamir, Robinson, Clore, Martin, & Whitaker (2004) Iyengar & Lepper (2000) Petrova & Cialdini (2005); Mandel, Petrova, & Cialdini (2006) Day & Gentner (2006); Labroo, Dhar, & Schwarz (2008); Lee & Labroo (2004) Rhodes, Halberstadt, & Brajkovich (2001); Winkielman, Halberstadt, Fazendeiro, & Catty (2006) | Liking | Retrieval ease Visual ease Visual contour priming Embodied cognition Decision conflict Imagination ease Conceptual priming Prototypicality | Easily retrieved stimuli are preferred to difficult-to-retrieve stimuli. Stimuli against highly contrastive backgrounds are preferred to stimuli against less contrastive backgrounds. Primed visual contours are preferred to nonprimed visual contours. Chosen posters are preferred when chosen with puffed cheeks rather than a furrowed brow. Difficult-to-choose items are less preferred than easy-to-choose items. Easier-to-imagine travel destinations are preferred to difficult-to-imagine destinations. A passage of text is preferred when primed with a related passage of text; a product is preferred when primed with related concepts. Prototypical faces and dot configurations are preferred to alternatives that deviate substantially from the prototype. |

| <i>Research Article</i> | <i>Judgment Domain</i> | <i>Fluency Manipulation</i> | <i>Basic Finding</i> |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Reder (1987); Schwartz & Metcalfe (1992) | Confidence | Semantic priming | Trivia responses feel more accurate when primed with related concepts. |
| Alter, Oppenheimer, Epley, & Eyre (2007); Novemsky, Dhar, Schwarz, & Simonson (2007); Simmons & Nelson (2006a, 2006b) | | Visual ease | Statements written in easy-to-read font inspire confidence. |
| Hertzog, Dunlosky, Robinson, & Kidder (2003) | | Encoding ease | Independent of accuracy, information seems easier to remember when it is easily encoded. |
| Kelley & Lindsay (1993) | | Retrieval ease | Trivia responses feel more accurate when easily retrieved from memory. |
| Alter et al. (2007); Stepper & Strack (1993); Tourangeau & Ellsworth (1979) | | Embodied cognition | Trivia responses feel more accurate when answered with puffed cheeks rather than a furrowed brow. |
| Tversky & Kahneman (1973) | Frequency/ familiarity | Retrieval ease | Categories with exemplars that are difficult to retrieve seem less populated. |
| Reber & Zupaneck (2002) | | Visual ease | Words written in easier-to-read font seem more familiar than words written in difficult-to-read font. |
| Whittlesea & Williams (1998) | | Linguistic (word level) | Nonwords of regular form (e.g., <i>hension</i>) seem more familiar than nonwords of irregular form (e.g., <i>stowfus</i>). |
| Whittlesea (1993) | | Semantic priming | Semantically primed words seem more familiar than nonprimed words. Easier-to-imagine events seem more likely to happen. |
| Kahneman & Tversky (1982) Jacoby & Dallas (1981) | | Retrospective imagery Retrieval ease | Previously exposed words feel as though they are presented for longer during a second presentation. |
| Oppenheimer (2006) | Intelligence | Visual ease; linguistic (word level); linguistic (sentence level) | Easier to process text seems to have been written by a more intelligent author. |

| <i>Research Article</i> | <i>Judgment Domain</i> | <i>Fluency Manipulation</i> | <i>Basic Finding</i> |
|-----------------------------------------------------------------------------------|------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alter & Oppenheimer (2006, 2008b); Borges, Goldstein, Ortman, & Gigerenzer (1999) | Valuation | Linguistic (phonotactic); retrieval ease | More easily pronounced financial stocks outperform less easily pronounced financial stocks; fluent currency (notes and coins) seems more valuable; recognized stocks outperform unrecognized stocks. |
| Jacoby, Woloshyn, & Kelley (1989); Strack & Neumann (2000) | Fame | Retrieval ease | Previously presented faces seem more famous than novel faces; faces seem less famous when perceivers furrow their brows. |
| Goodwin (2006) | Faultiness | Reasoning | Difficult-to-process components of electrical circuits seem more faulty. |
| Collister & Tversky (2000); Oppenheimer & Frank (2007) | Category typicality | Visual ease; retrieval ease | Visually fluent exemplars seem more typical of a category; common exemplars seem typical, controlling for feature typicality. |

Alter & Oppenheimer (2009) ; Schwarz et al. (2009)

Is this always the case?



Affective preference without recognition



The study of Kunst-Wilson & Zajonc (1980) :

Repeated exposure can result in higher preference for the presented stimulus even if people are not able to recognize the stimulus.

Affective preference without recognition

The authors showed participants abstract shapes subliminally.

After this exposure phase, they showed pairs of abstract shapes. One of them has been presented before, the other was new.

They asked their participants:

- (a) Which shape do you like more; 60% of the participants chose the shape presented before;
- (b) Which shape have you seen before; 48% of the participants chose the shape presented before.

This study demonstrated that participants liked the old shapes significantly more than new shapes, but recognition was at chance level.

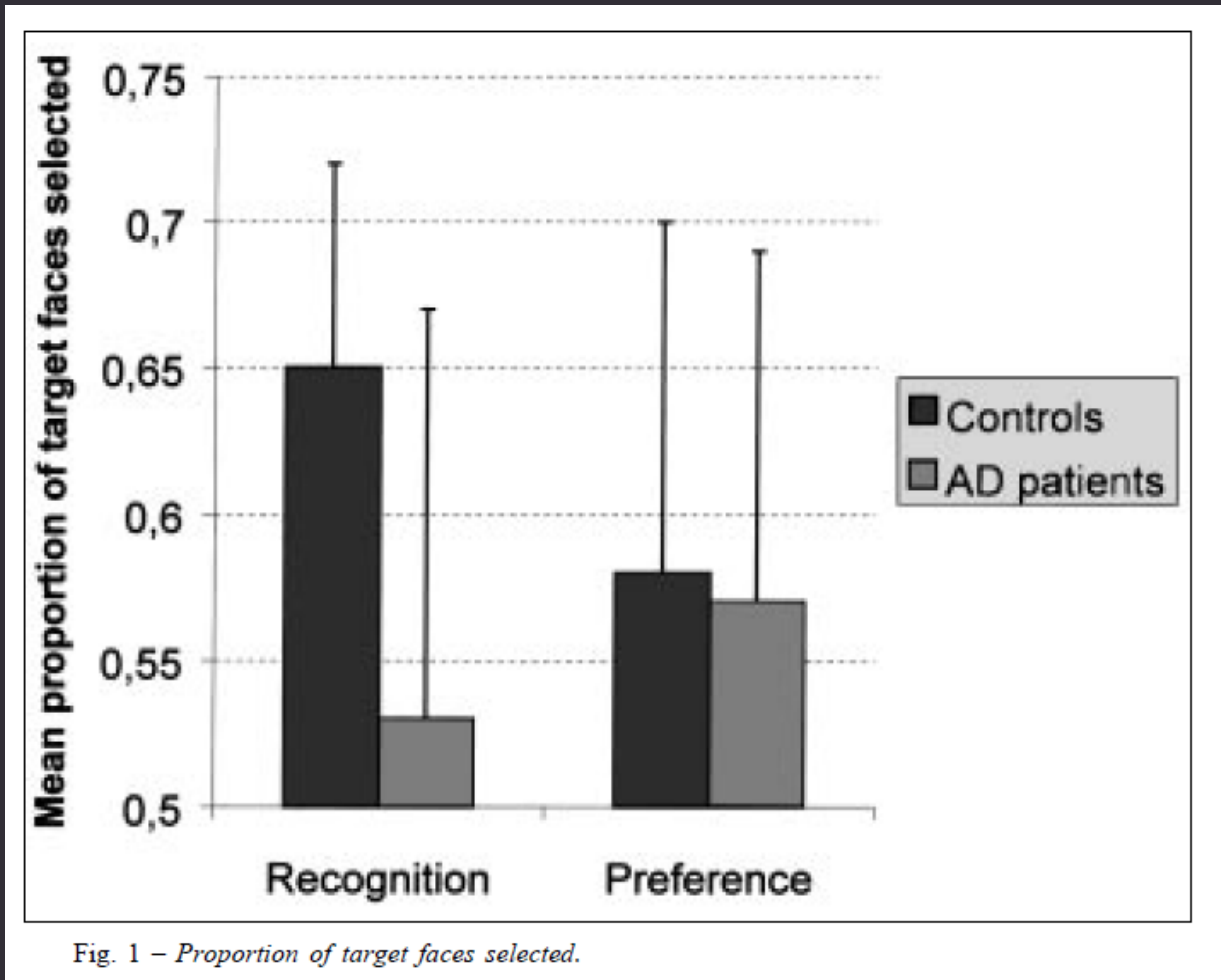
Affective preference without recognition in AD

TABLE 1
Participants' Characteristics

| | AD patients | Controls | t (26) |
|-------------------|-------------|-------------|--------|
| Female | 10 | 10 | |
| Male | 4 | 4 | |
| Age (years) | | | -0.52 |
| Mean (SD) | 75.5 (5.7) | 74.3 (6.6) | |
| Education (years) | | 0.64 | |
| Mean (SD) | 10.9 (4.2) | 11.9 (4) | |
| DRS | | | |
| Mean (SD) | 120.1 (9.1) | 139.2 (4.3) | 7.01* |
| Range | 107-138 | 131-144 | |
| MMSE | | | |
| Mean (SD) | 20.7 (3.9) | 28.8 (1.4) | 7.26* |
| Range | 22-26 | 26-30 | |

Note. For both groups, N = 14; DRS = Mattis Dementia Rating scale (Coblenz et al., 1973); MMSE = Mini-Mental State Examination (Folstein et al., 1975); AD = Alzheimer's disease.
*p < .001.

Affective preference without recognition in AD



Affective preference without recognition

A substantial body of literature shows a functional dissociation between memory performance measured with explicit recognition tests and preference in patients with severe memory impairment (Greve & Bauer, 1990; Johnson & Multhaup, 1992; Willems, Adam, & Van der Linden, 2002; Willems, Salmon, & Van der Linden, 2008)



FLUENCY & PROCESSING STYLES



Fluency and Processing Styles

Preference/Recognition Dissociation in Alzheimer's Disease: The Consequence of Inappropriate Processing?

We suggest that because of the greater perceived difficulty of recognition tasks than preference tasks, memory-impaired patients will be motivated to spontaneously process items analytically for recognition judgments but nonanalytically for preference judgments.

Fluency and Processing Styles

Preference/Recognition Dissociation in Alzheimer's Disease: The Consequence of Inappropriate Processing?

3-test days were organized with three versions of the tasks:

- (a) **standard instructions** (standard preference and recognition judgment tasks),
- (b) **Nonanalytic instructions** (standard preference and nonanalytic recognition judgment tasks),
- (c) **analytic instructions** (analytic preference and recognition judgment tasks).

Fluency and Processing Styles

Table 1
Participants' Characteristics

| | AD patients | Controls | <i>t</i> (30) |
|-------------------|-------------|----------|---------------|
| Female | 13 | 13 | |
| Male | 3 | 3 | |
| Age (years) | | | -0.52 |
| <i>M</i> | 80.7 | 82.3 | |
| <i>SD</i> | 7.8 | 6.5 | |
| Education (years) | | | 0.64 |
| <i>M</i> | 8.5 | 8.9 | |
| <i>SD</i> | 2.8 | 3.1 | |
| DRS | | | |
| <i>M</i> | 114.2 | 141.7 | 7.01* |
| <i>SD</i> | 5.7 | 2.6 | |
| MMSE | | | |
| <i>M</i> | 21.1 | 29.2 | 7.26* |
| <i>SD</i> | 2.2 | 0.7 | |

Note. For both groups, $N = 16$. AD = Alzheimer's disease; DRS = Mattis Dementia Rating Scale (Mattis, 1973); MMSE = Mini-Mental State Examination (Folstein et al., 1975).

* $p < .001$.

Fluency and Processing Styles

Table 2
Preference and Recognition Scores

| Condition | AD patients | | | Controls | | |
|-------------------------|---------------|---------------|----------|---------------|---------------|----------|
| | Hit | FA | <i>d</i> | Hit | FA | <i>d</i> |
| | <i>M (SD)</i> | <i>M (SD)</i> | | <i>M (SD)</i> | <i>M (SD)</i> | |
| Standard | | | | | | |
| Standard recognition | .28 (.22) | .28 (.27) | 0.02 | .82 (.16) | .25 (.12) | 1.41** |
| Standard preference | .66 (.26) | .42 (.26) | 0.67* | .59 (.20) | .36 (.13) | 0.83** |
| Nonanalytic | | | | | | |
| Nonanalytic recognition | .56 (.21) | .25 (.19) | 1.01** | .82 (.12) | .39 (.16) | 1.21** |
| Standard preference | .61 (.16) | .33 (.21) | 0.82** | .57 (.23) | .34 (.27) | 0.70* |
| Analytic | | | | | | |
| Analytic recognition | .36 (.27) | .30 (.26) | 0.25 | .84 (.23) | .34 (.16) | 1.51* |
| Analytic preference | .56 (.30) | .46 (.28) | 0.38 | .41 (.19) | .27 (.14) | 0.69** |

Note. Values are proportions of “like” or “old” responses for old objects (hit) and distracters (FA). Effect sizes (*d*) of *t* tests are provided with reference to the classification of effect sizes proposed by Cohen (1988): small *d* = 0.20, medium *d* = 0.50 and large *d* = 0.80. AD = Alzheimer’s disease; FA = false alarm.

* $p < .01$. ** $p < .001$.

Fluency and Processing Styles

The fluency effect depend on the way you look!

Analytic processing: more fixations ; wider scanning.

This gaze behavior might correspond to an active visual search for stimulus components to see whether any of them are useful cues for the judgment task.

Nonanalytic processing: more restricted gaze searching and fewer fixations than analytic processing; independence of fluency effect and eye movement patterns

Fluency and Processing Styles

Alter et al. (2007)

High fluency may signal that the interaction between person and environment is going smoothly; therefore not much has to be done, and people can **think heuristically**.

In contrast, **low processing** fluency signals that something is wrong and attention is needed; people have to **think analytically**.

Alter et al. (2007) tested this assumption.

Fluency and Processing Styles

In one of their experiments, they gave participants the Cognitive Reflection Test (CRT). In this test, an intuitively plausible answer contradicts the correct answer which can be found after some thinking.

A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?

Fluency and Processing Styles

The authors presented the CRT in an easy-to-read font (fluent condition) for one group and in a difficult-to-read font (disfluent condition) for another group.

From the participants in the fluent condition, 90% made at least one mistake, but only 35% of the disfluent condition did so.

Fluency and Processing Styles

Other experiments in the same article showed that processing ease, compared to processing difficulty, led to more heuristic processing in product evaluation (e.g., the representativeness heuristic, and syllogistic reasoning).

In sum, the studies supported the notion that easy processing signals that the situation is well, eliciting heuristic processing, whereas processing difficulties signal problems and elicit analytical processing (see [Song & Schwarz, 2008](#), for a similar finding).



FLUENCY & METACOGNITIVE CONTROL

A Discrepancy Attribution Process?



Whittlesea and Williams (1998)

Feelings of Familiarity occur when
SURPRISINGLY
fluent/good processing is attributed to
Prior Exposure to a Stimulus

A Discrepancy Attribution Process?



Depending on material/context, people have different implicit expectations of processing fluency.

When those expectations are violated, search for some explanation.

In many cases, context itself provides a natural attribution.

A Discrepancy Attribution Process?

Whittlesea and Williams (1998)

Study Phase:

People studied a list consisting of three types of items:

Words (e.g., VIOLIN)

Non-Words (e.g., PLANDIT)

Pseudohomophones (e.g., BAUTEL, PHRAUG)

A Discrepancy Attribution Process?



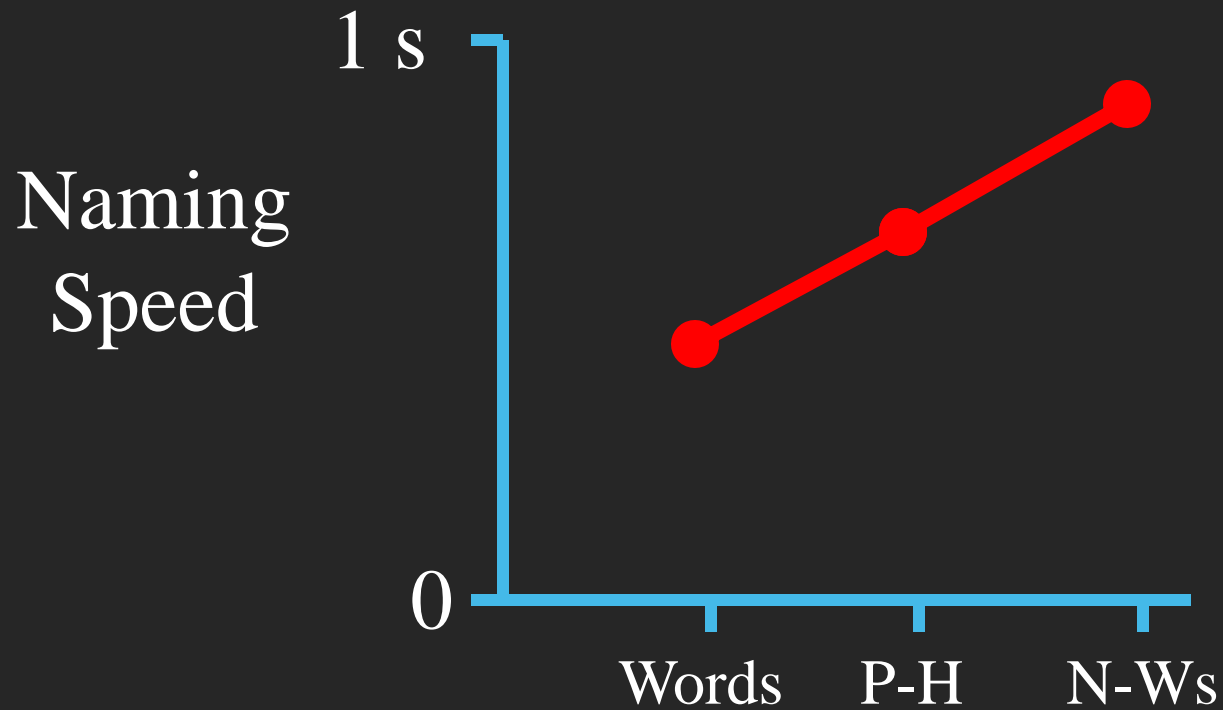
Whittlesea and Williams (1998)

Test Phase:

Recognition Test on Old and New

Words, Non-Words, and Pseudohomophones

A Discrepancy Attribution Process?



A Discrepancy Attribution Process?



Words

Are processed more quickly and have meaning,
but no surprise

Pseudohomophones

Do not look like a real words,
but easy
SURPRISE!!

A Discrepancy Attribution Process?

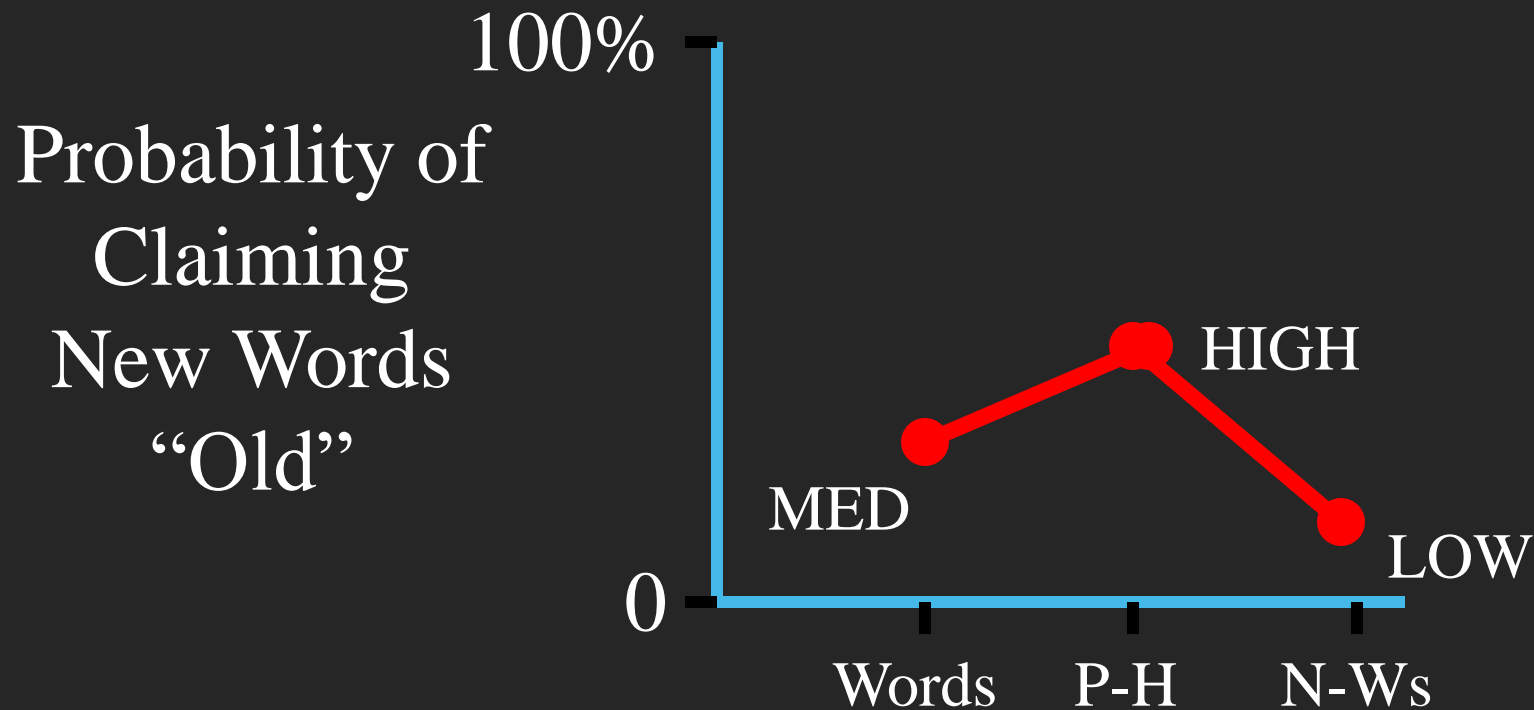


Predictions:

If **fluency** causes feelings of familiarity, people should judge **words “old”** more often

If **surprising** fluency causes feelings of familiarity, people should judge **pseudohomophones “old”** more often

A Discrepancy Attribution Process?



A Discrepancy Attribution Process?



Results:

Highest claims of “old” for pseudohomophones
that were not actually studied

Second highest for unstudied words and
lowest for unstudied non-words

Supports the
Discrepancy Attribution Hypothesis

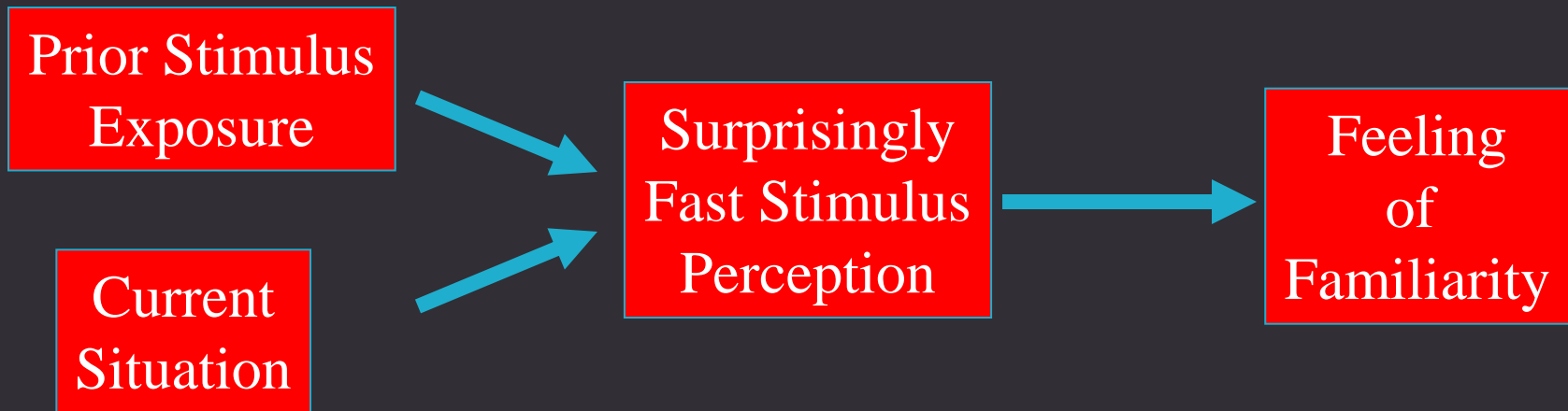
A Discrepancy Attribution Process?

Conclusion:

Feelings of Familiarity occur when
SURPRISINGLY
fluent/good processing is attributed
to Prior Exposure to a Stimulus

A Discrepancy Attribution Process?

Whittlesea and Williams (1998)



A Discrepancy Attribution Process?



Other Feelings (**liking**, Willems & Van der Linden, 2006 ; **true**, Hansen et al., 2008) occur when fluent/good processing is unexpected

A Discrepancy Attribution Process?



The impact of fluency is moderated by expectations and attribution.

Fluency has a particularly strong impact on judgment if its source is unknown and fluent processing comes as a surprise

A Discrepancy Attribution Process?

The evolution of fluency heuristic in amnesia

In amnesia, we noted that the “fluency as a sign of prior exposure” postulate (i.e., the interpretation of fluency as an indicator of a past encounter) could progressively evolve at the same time as the integration of memory difficulty into autobiographical knowledge

A Discrepancy Attribution Process?

Table 1. Summary of Neuropsychological Characteristics of Amnesic Patients

| Etiology | Age | ED | Time since diagnosis | WAIS-III | WMS-III | | | |
|--------------------|-----|----|-------------------------|----------|---------|----|----|----|
| | | | | | WM | GM | AD | VD |
| Anoxia | 55 | 15 | 6 | 81 | 97 | 45 | 60 | 56 |
| Anoxia | 28 | 12 | 28 | 135 | 127 | 59 | 54 | 75 |
| Encephalitis | 51 | 16 | 3 | 96 | 88 | 69 | 79 | 75 |
| Korsakoff | 51 | 8 | 1 | 88 | 85 | 47 | 60 | 52 |
| Korsakoff | 52 | 12 | 1 | 118 | 111 | 65 | 60 | 78 |
| Closed-head injury | 37 | 15 | 4 | 110 | 82 | 45 | 57 | 52 |
| Closed-head injury | 43 | 12 | 7 | 103 | 80 | 45 | 57 | 45 |
| Closed-head injury | 40 | 15 | 13 | 119 | 82 | 45 | 60 | 45 |

(Willems et al., rev)

A Discrepancy Attribution Process?



Does auditory information seem simpler to you when you have heard it before?

Do you have the impression that you process briefly presented visual information faster and more easily when you have seen it before?

Does complex or poor quality visual information seem clearer, more distinct and therefore easier to process when you have seen it before?

A Discrepancy Attribution Process?

Results:

(1)

The amnesic patients agreed significantly less with these statements than the control participants.

⇒ the amnesic patients interpret fluency as a prior exposure sign to a lesser degree than control participants

(2)

Negative correlation between amnesic patients' scores and the time elapsed since the diagnosis ($r = -.40$)

(3)

positive correlation with Memory Awareness Rating Scale ($r = .21$)

A Discrepancy Attribution Process?

Results:

(4)

Positive correlation between amnesic patients' scores and recognition ($r = .81$).

A Discrepancy Attribution Process?

Results:

(5)

amnesic patients attribute more readily the fluency to an external source than to the past (i.e. to their memory)

(Hyper discrepancy attribution effect)

Table 4. Mean proportion of “old” responses for targets by test pair contrast

| | Base | External source of High Fluency | External source of Low fluency |
|----------------|-----------|------------------------------------|-----------------------------------|
| <i>Control</i> | .66 (.15) | .65 (.16) | .72 (.17) |
| <i>Amnesic</i> | .52 (.16) | .39 (.17) | .52 (.19) |

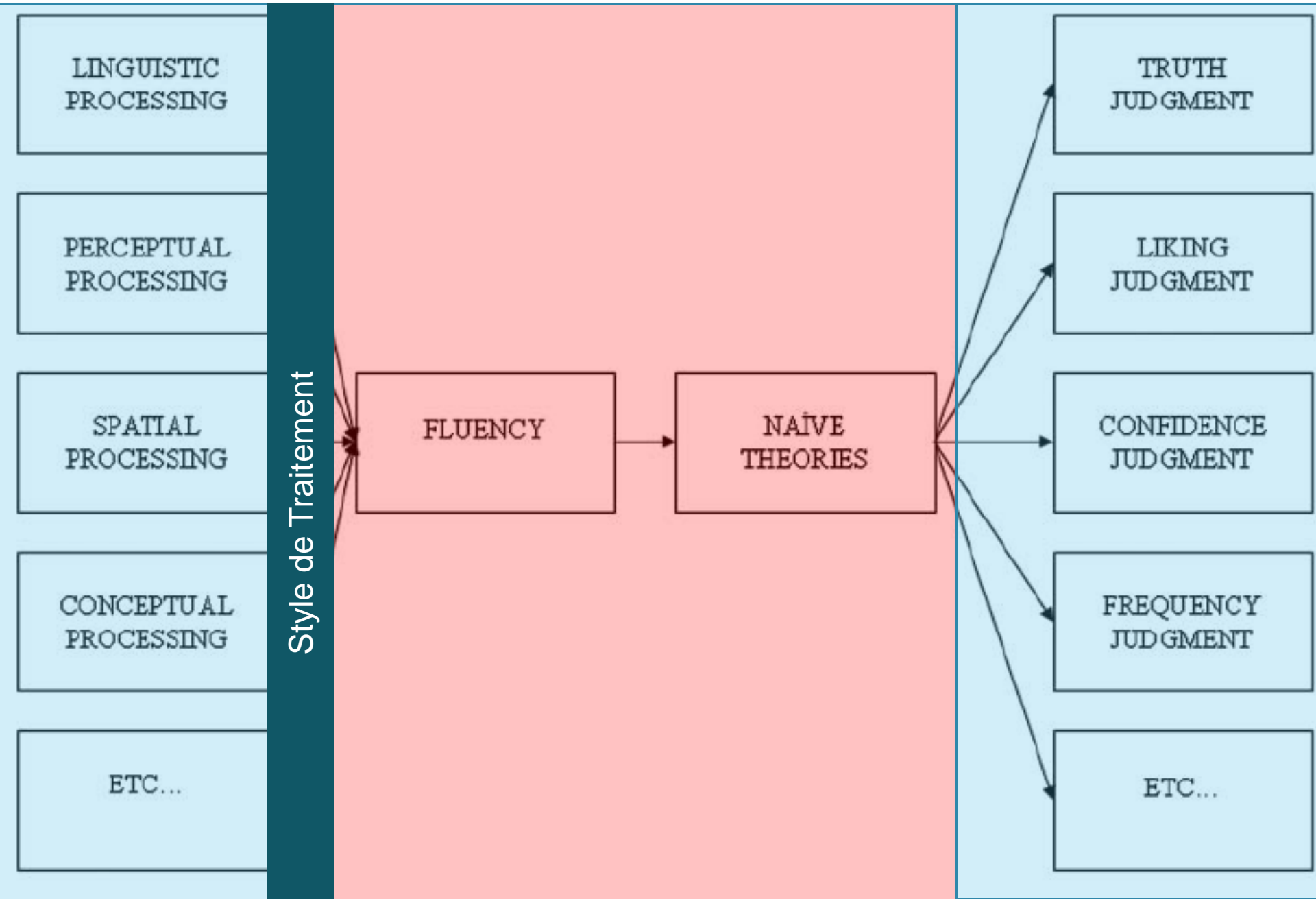
STAGE 1: COGNITION + METACOGNITION



STAGE 2: INTEGRATION OF FLUENCY WITH NAÏVE THEORIES



STAGE 3: DOMAIN-SPECIFIC JUDGMENT OUTPUT



LINGUISTIC PROCESSING

PERCEPTUAL PROCESSING

SPATIAL PROCESSING

CONCEPTUAL PROCESSING

ETC...

Style de Traitement

FLUENCY

NAÏVE THEORIES

TRUTH JUDGMENT

LIKING JUDGMENT

CONFIDENCE JUDGMENT

FREQUENCY JUDGMENT

ETC...



FLUENCY & MEMORY



The Case of Recollection

Fluency & Recollection

Recognition occurs because of:

- 1). Feeling of recollection - reliable outcome of a “high-threshold” recollection process (i.e., recollection of context either occurs or it does not: Yonelinas, 1994). – **is it direct and bias free?**
- 2). Feeling of familiarity - less reliable product of inferences about a graded and continuous variable (fluent processing) – **inferential and leads to biases.**

Fluency & Recollection

For some authors,

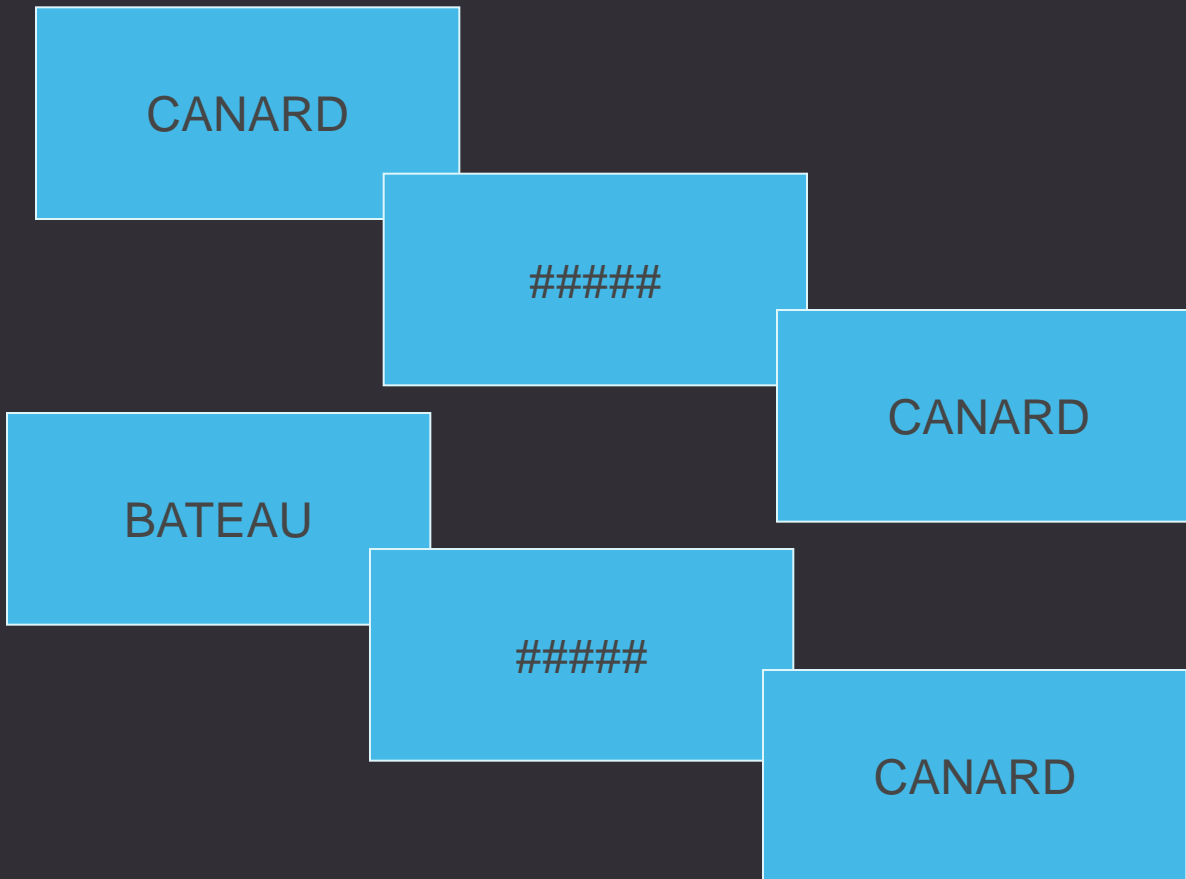
Feeling of recollection

(1)
= **product of inference and attribution** of current stimulus processing to a previously encountered source (Whittlesea, 2002)

(2)
= **graded, continuous variable** (see, e.g., Reder et al., 2000; Rotello, Macmillan, & Reeder, 2004;) rather than an all-or-none threshold-like process .

(3) The **standard remember–know paradigm ignores this** and forces *participants* to artificially dichotomize their subjective experiences (Higham and Vokey, 2004).

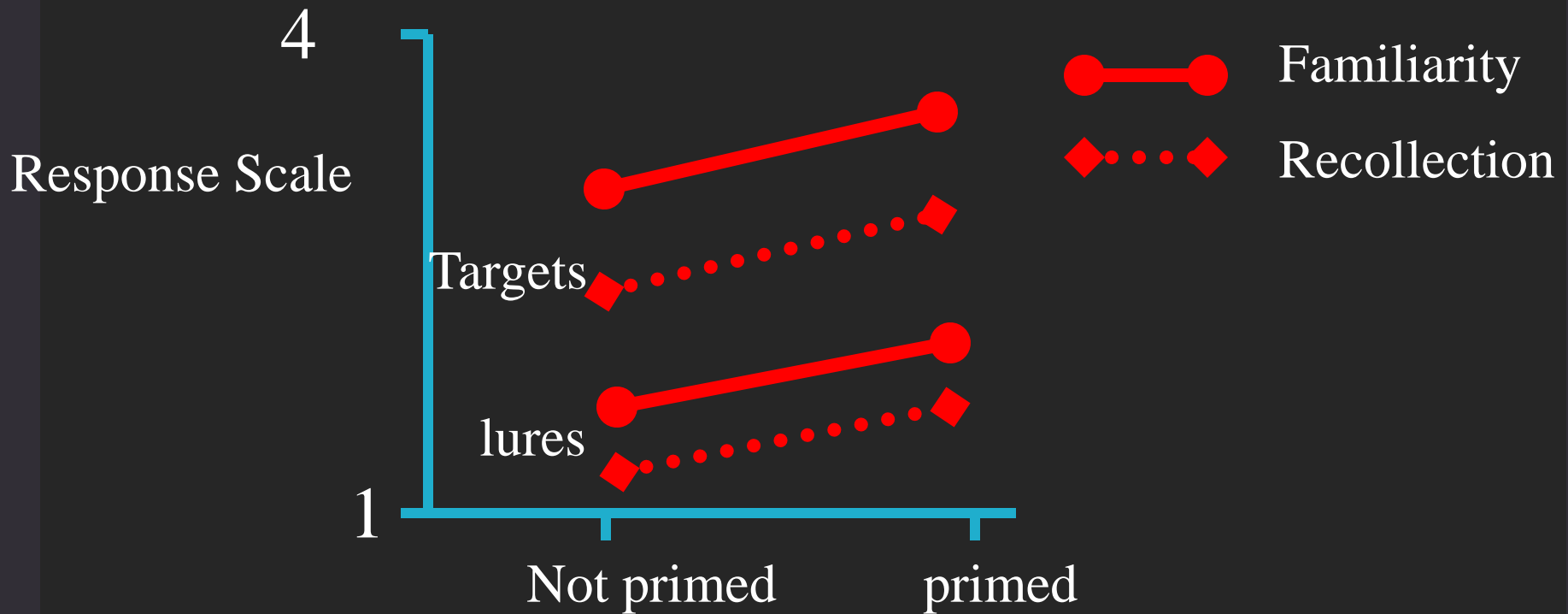
(2) Fluency & Recollection



« Oui, vu avant »
independent
Remember/Know scales

« Non, jamais vu »

(2) Fluency & Recollection



(3) Fluency & Recollection



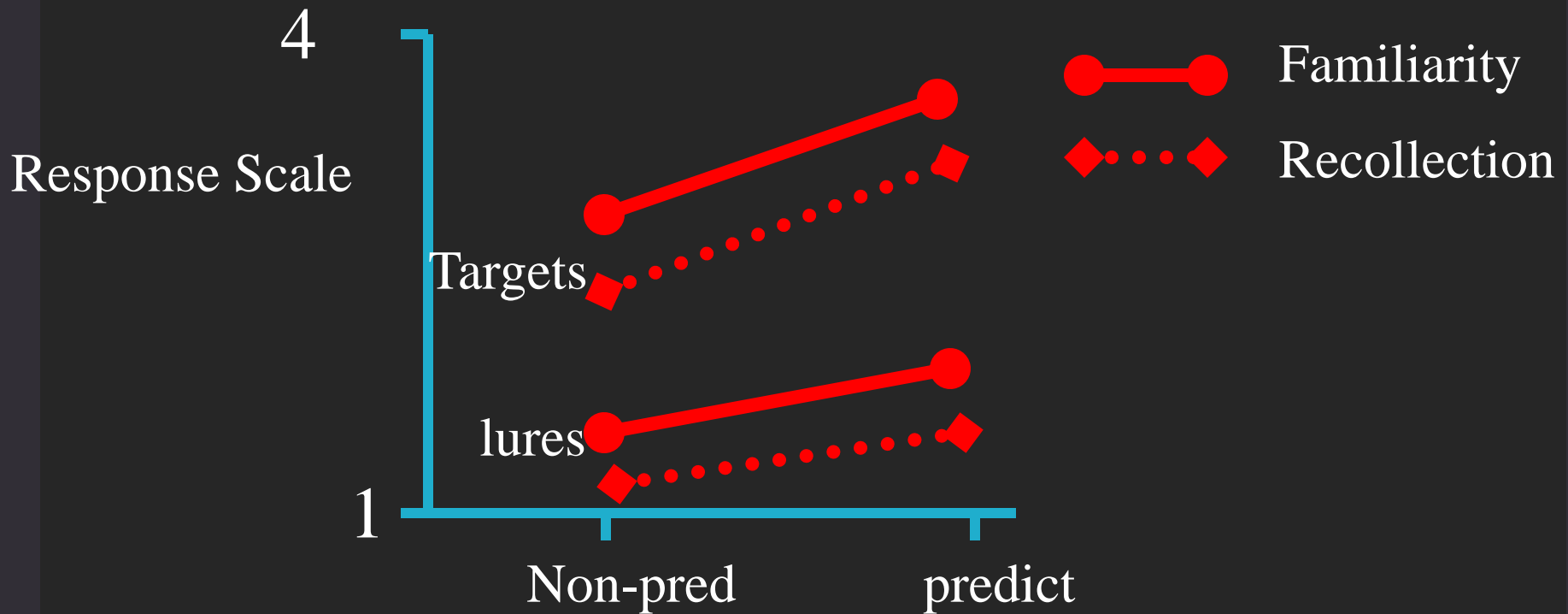
Predictive Sentence

The stormy seas tossed the BOAT

Non-Predictive Sentence

She saved up her money to buy a HOUSE

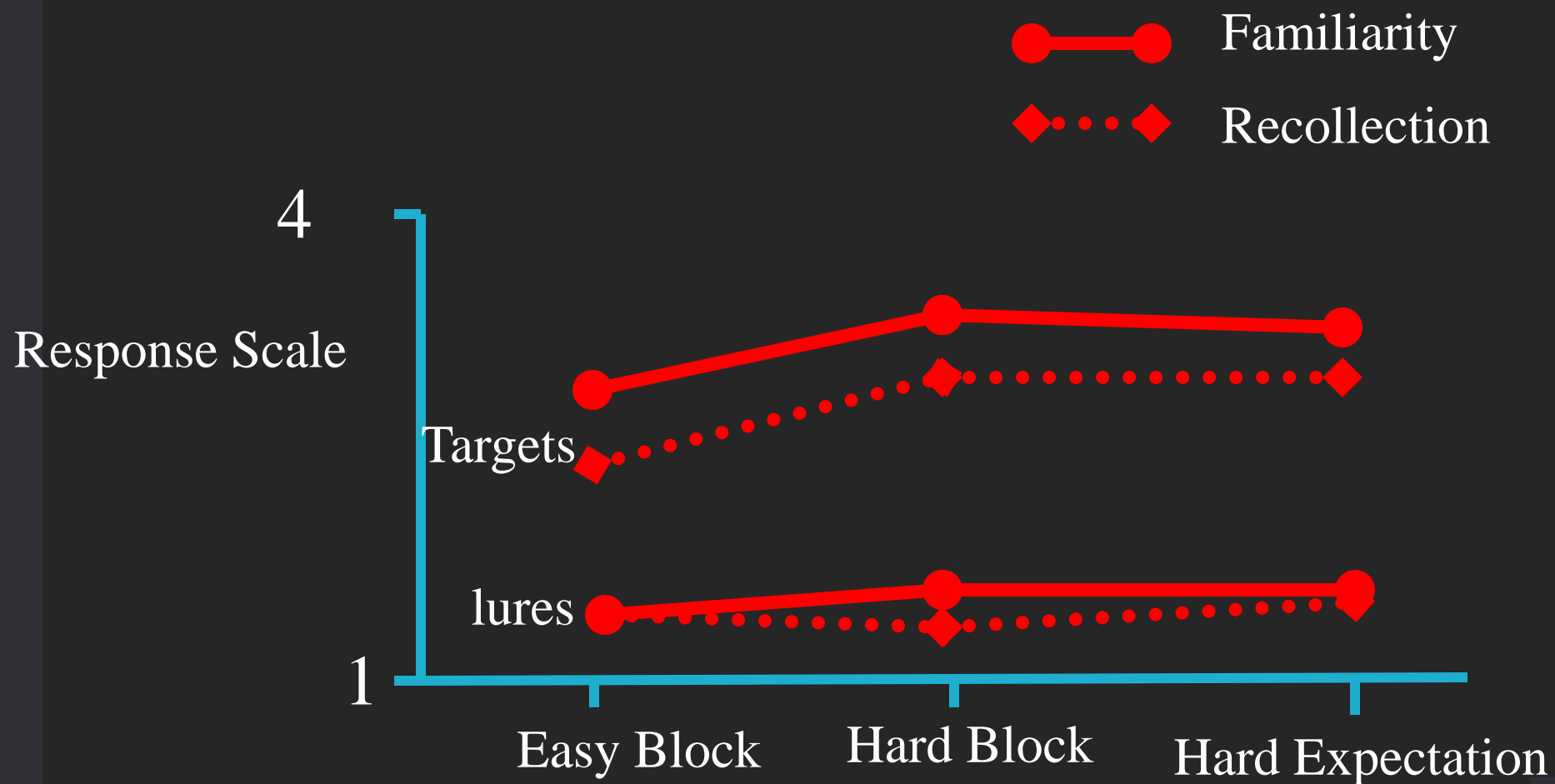
(3) Fluency & Recollection



(4) Fluency & Recollection

- We examined how recognition judgements for a set of event details are influenced by (1) the relative difficulty of the other first details included on the test (2) the difficulty expectations.
- Participants viewed a crime event and then assigned remember/know judgements to details on a recognition test.

(4) Fluency & Recollection





Conclusion:

Based on subjective experience associated with recollection, an inference is formed about the quality of information that comes to mind.

Fluency & Recollection



Recognition occurs because of:

- 1). A feeling of familiarity – inferential and leads to biases.
- 2). Memory Search and Retrieval – also inferential and leads to biases.

In Summary:



Both the feeling of familiarity and memory retrieval do NOT directly reflect one's past experience

...but are based on an inference and an attribution made about current processing.

As a result, both can lead to errors.