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Mapping the Transition from Unconscious to Conscious Knowledge

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Unconscious knowledge precedes conscious knowledge

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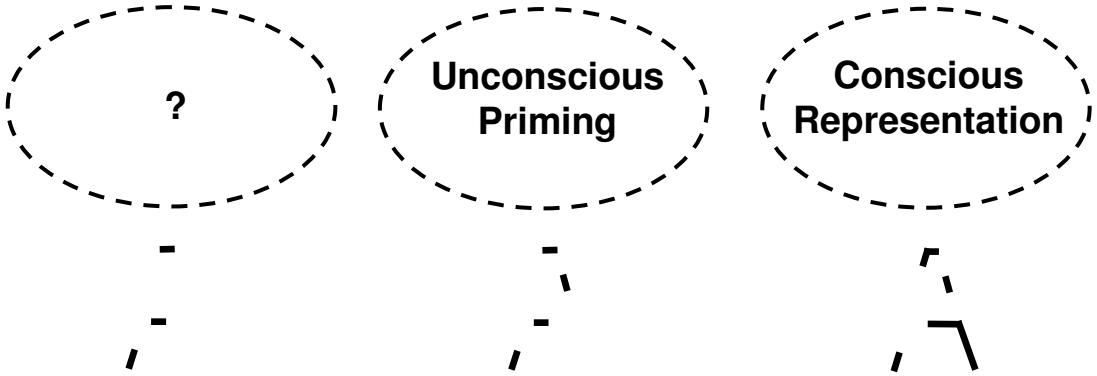
- Proposal: Unconscious knowledge may arise when the underlying representation is insufficiently strong to support awareness but of sufficient strength to have behavioural consequences (Cleeremans & Destrebeqz, 2003).
- Experimental support: In a Serial Reaction-time Task (SRT) the presence of unconscious knowledge occurred after short but not extended training (Fu, Fu, & Dienes, 2008) .



Artificial Grammar Learning (AGL)

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Training for Group A

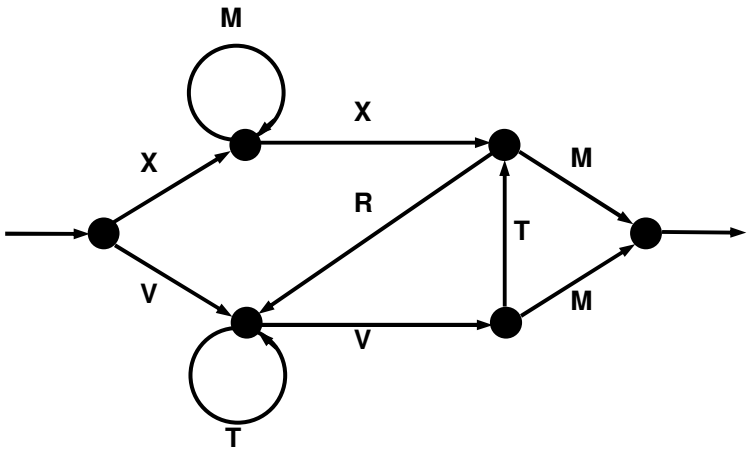
XMMXM

VTTVTM

XMXRVM

VVTRTVM

…



Training for Group B

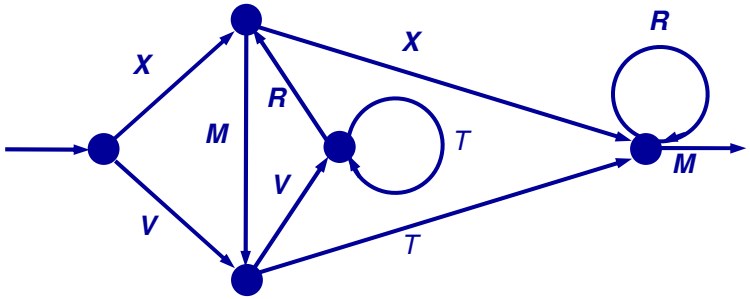
XMTRM

VVRMTM

XMTRRM

VTRRRRM

…



Testing for Group A and B

VTVTM

VTRRM

XXRVM

XXRRM

…

The guessing criterion of unconscious knowledge

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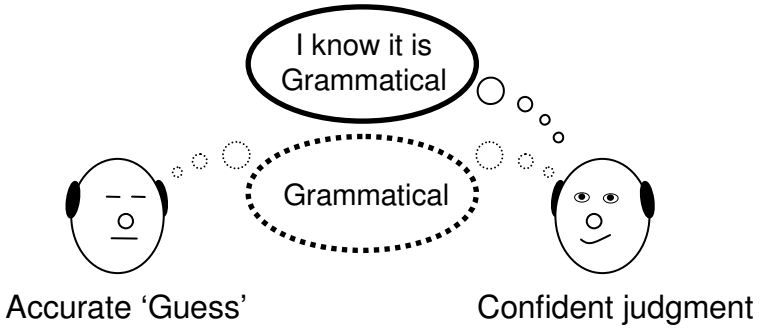
- We adopt HOT (Higher Order Thought) theory (Rosenthal, 2002) and use subjective measures of consciousness .
- HOT theories account for consciousness in terms of higher-order representations – for a state to be conscious there must be a representation of oneself as being in that state.
- HOT theory is implicit in the use of the guessing criterion of unconscious knowledge.



Judgment knowledge versus structural knowledge

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- The guessing criterion establishes only the status of *judgment knowledge*.
- This ignores a range of other mental states such as knowing why a string is ungrammatical e.g. knowing T cannot follow X - *structural knowledge*.
- Subjective reports can be used to asses the status of both types of knowledge and have revealed behavioural dissociations (Dienes & Scott, 2005).

Accurate Guess	Accurate Intuition	Accurate Rules
Unconscious Judgment Knowledge	**Conscious Judgment Knowledge**	**Conscious Judgment Knowledge**
Unconscious Structural Knowledge	**Unconscious Structural Knowledge**	**Conscious Structural Knowledge**

Experiment 1: Mapping the transition between knowledge states

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- 60 participants trained under the guise of a memory test.
- Participants classified each test string twice in two consecutive passes.
- In each pass participants reported:
  - Whether each string was grammatical (yes or no)
  - The basis for each grammaticality judgment:

Random **Intuition** **Familiarity** **Rules** **Recollection**

(no confidence) **(confidence with conscious or unconscious structural knowledge)**

Experiment 1: Percentage correct

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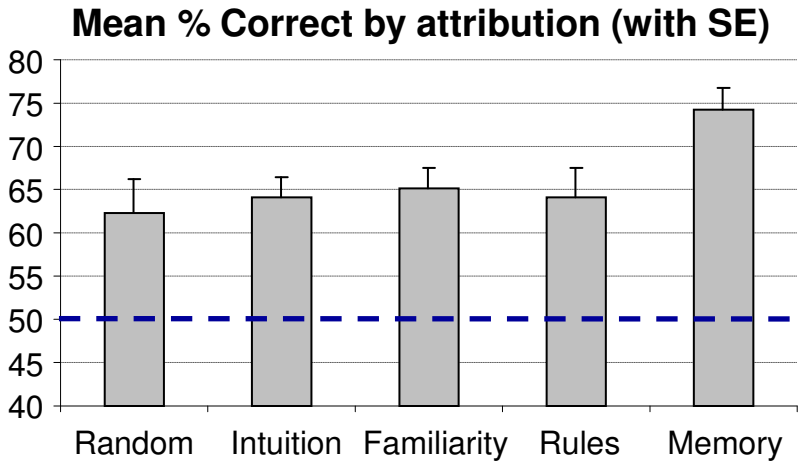
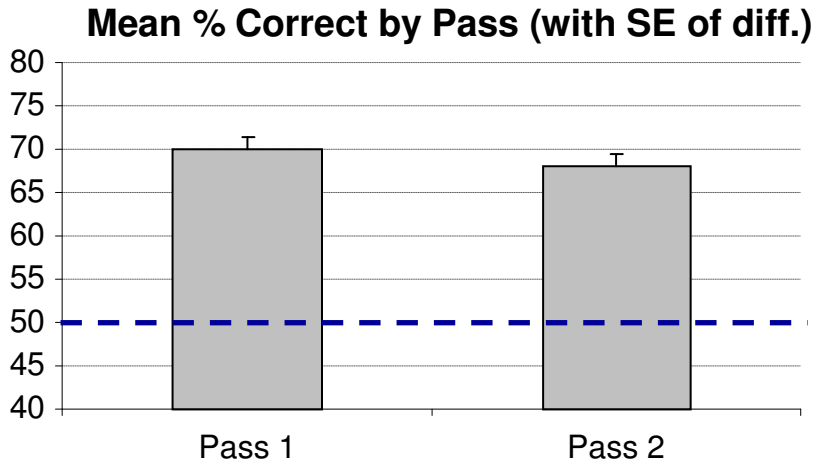
- The percentage correct is significantly greater than chance (50%) for all attribution categories.



- The percentage correct does not differ significantly between passes.



Experiment 1: Transition between attribution categories

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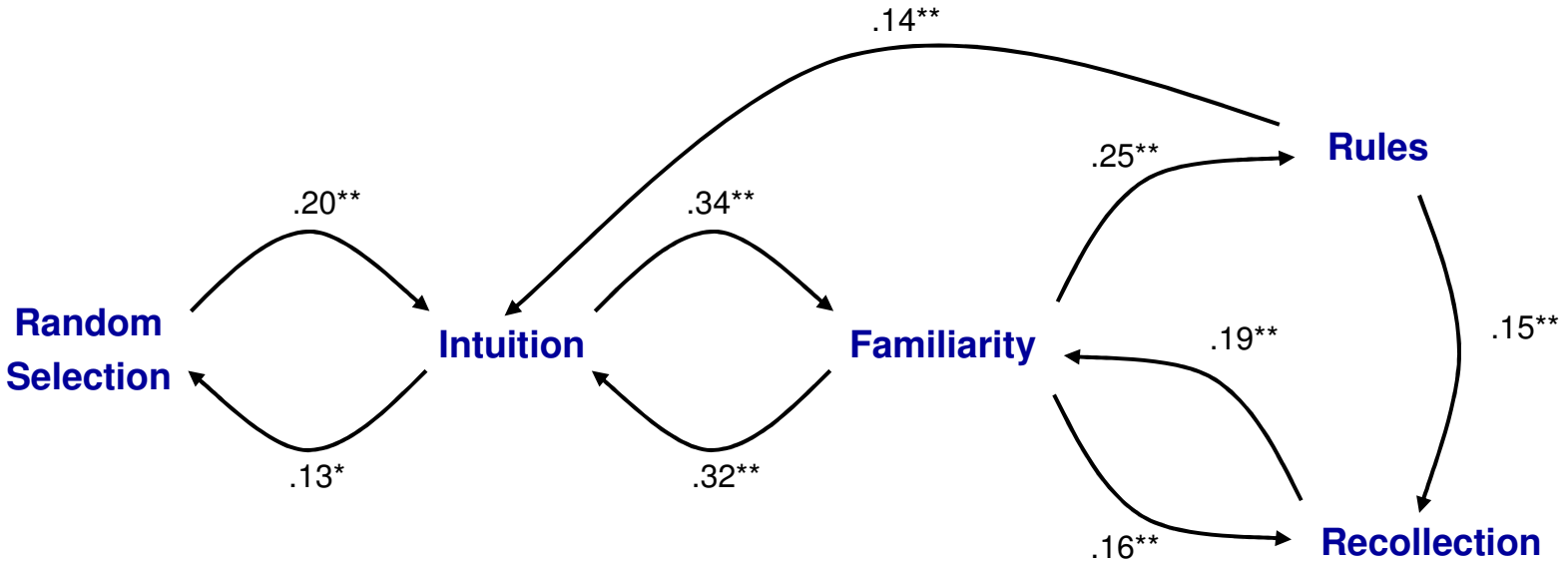
- Change in reported basis for grammaticality judgments for the same test strings classified in the first versus second pass.
- All significant positive associations are shown (mean Phi coefficients).



* $p < .05$ ** $p < .01$ $N = 60$ df range from 20 - 56

The Calibrated Familiarity Model

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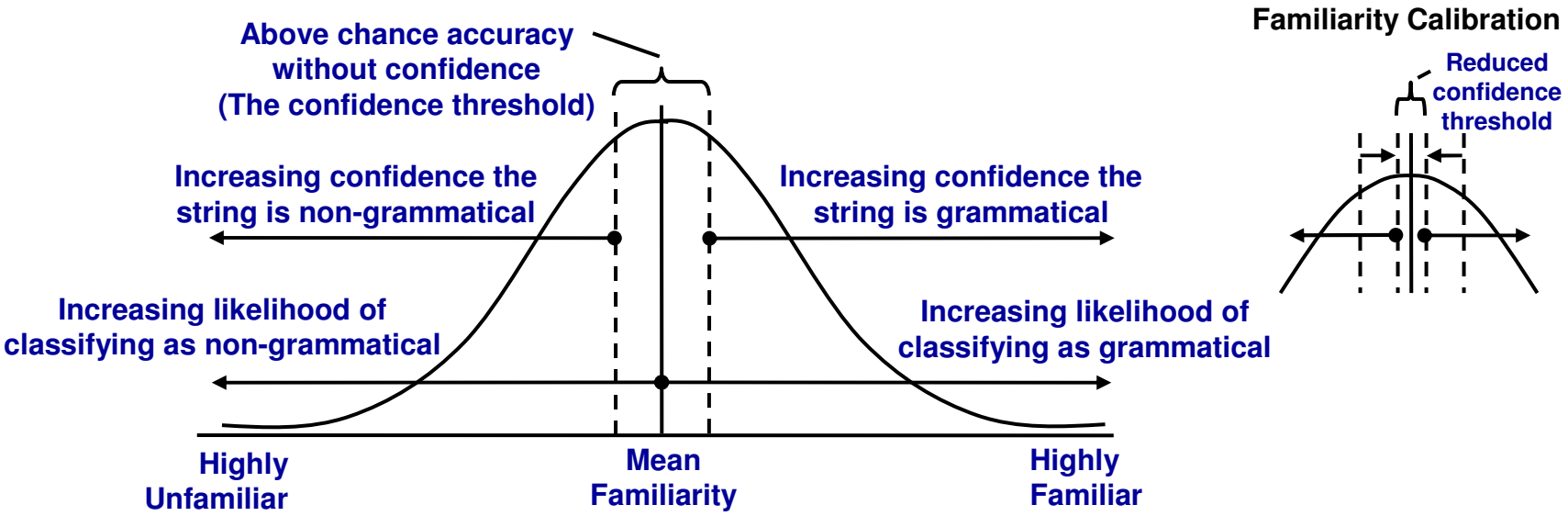
- The difference in familiarity from the mean guides grammaticality judgments.
- Initially small differences predict grammaticality without supporting confidence.
- Conscious judgment knowledge emerges through calibration, as knowledge of the distribution of familiarity (and its assessed reliability) increases (cf. Lau 2008)



Evidence for the role of familiarity

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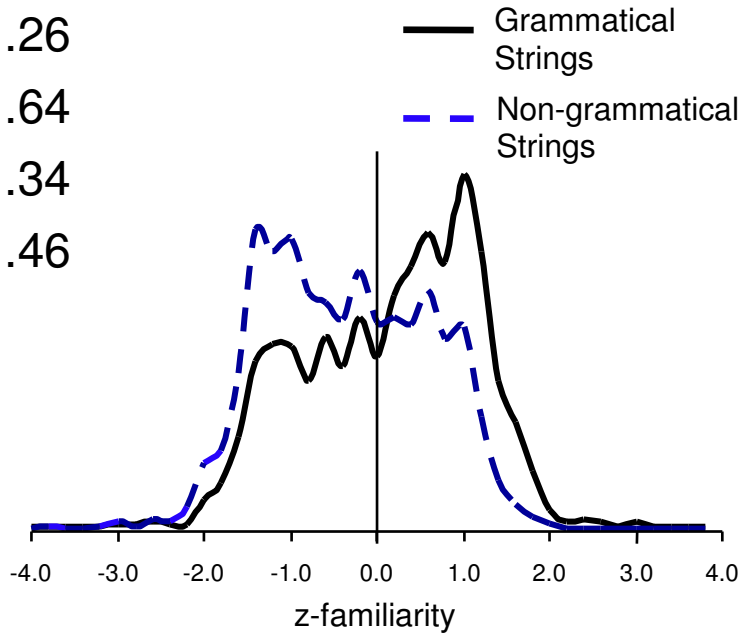
- Evaluated by having participants provide subjective familiarity ratings for each test string (Scott & Dienes, in press)

Correlations

Structural Similarity – Familiarity	$R = .40$
Familiarity – Grammatical Status	$r = .26$
Familiarity – Grammaticality Judgment	$r = .64$
(Random Attributions)	$r = .34$
Mean relative Familiarity – Confidence	$r = .46$



Scott & Dienes (in press). The conscious, the unconscious, and familiarity. *The Journal of Experimental Psychology: Learning, Memory, and Cognition.*

Experiment 2: Evaluating the calibration process

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- 160 participants.
- Trained on an artificial grammar in the usual manner.
- At test they were required to report:
  - Grammaticality judgments (yes or no)
  - Subjective familiarity ratings (0 – 100)
  - Confidence ratings (50 – 100)
  - Basis for their judgment (Guess, Intuition, Rules, or Recollection)
- The key manipulation:
  - Confidence encouragement – 50% of participants received feedback intended to encourage them to be more confident.

"Your responses so far have been under confident. Please try to report all your confidence"

Experiment 2: Manipulating confidence

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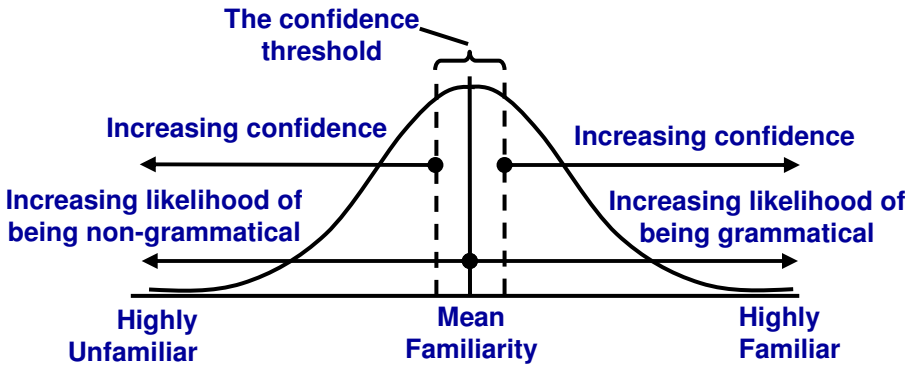
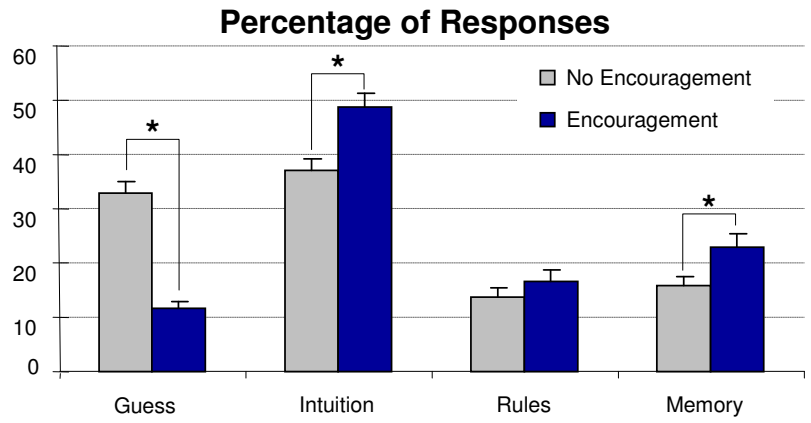
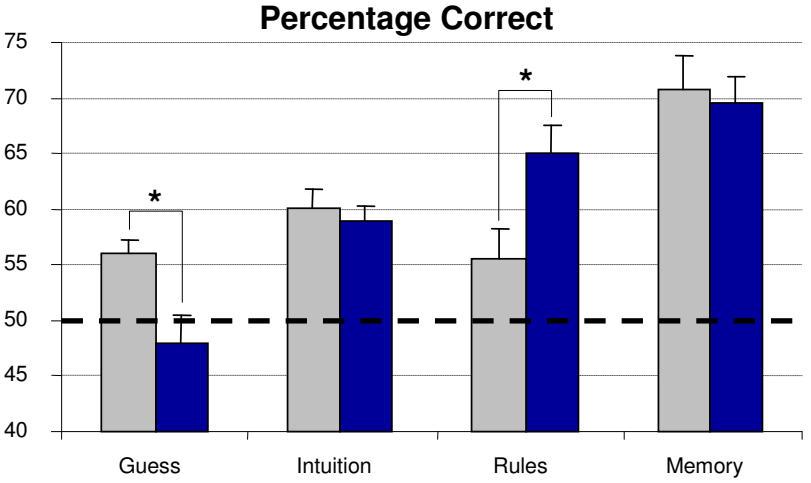
- No significant difference in overall accuracy for encouragement (61%) versus no encouragement (60%).
- The number and accuracy of guess responses significantly reduced by confidence encouragement.







Experiment 2: The calibration process

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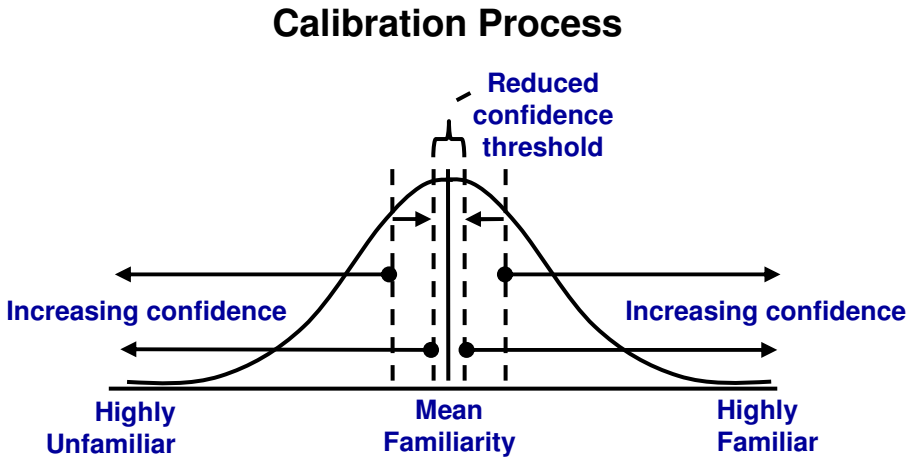
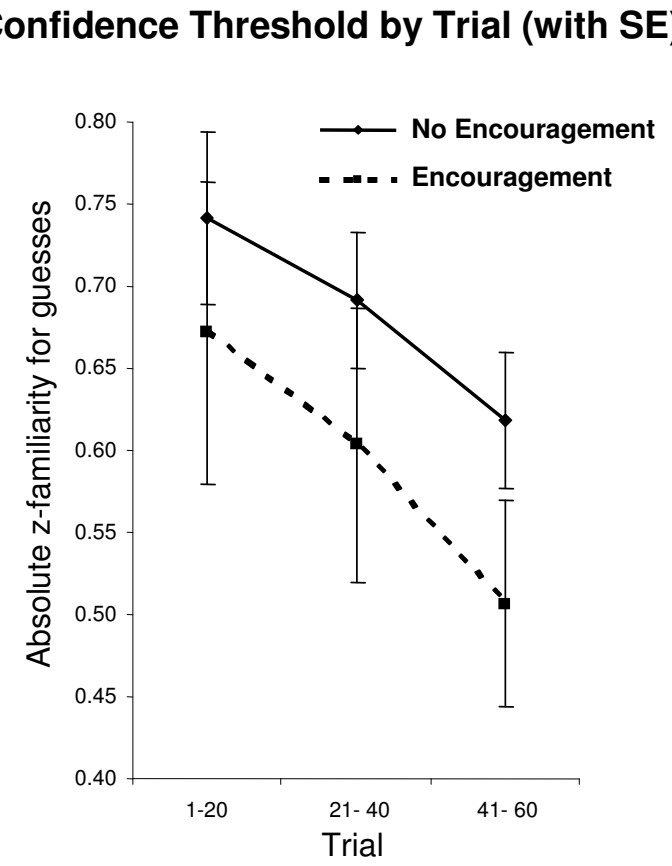
- Confidence threshold reduces with
  - Exposure to more strings
  - And confidence encouragement





Summary

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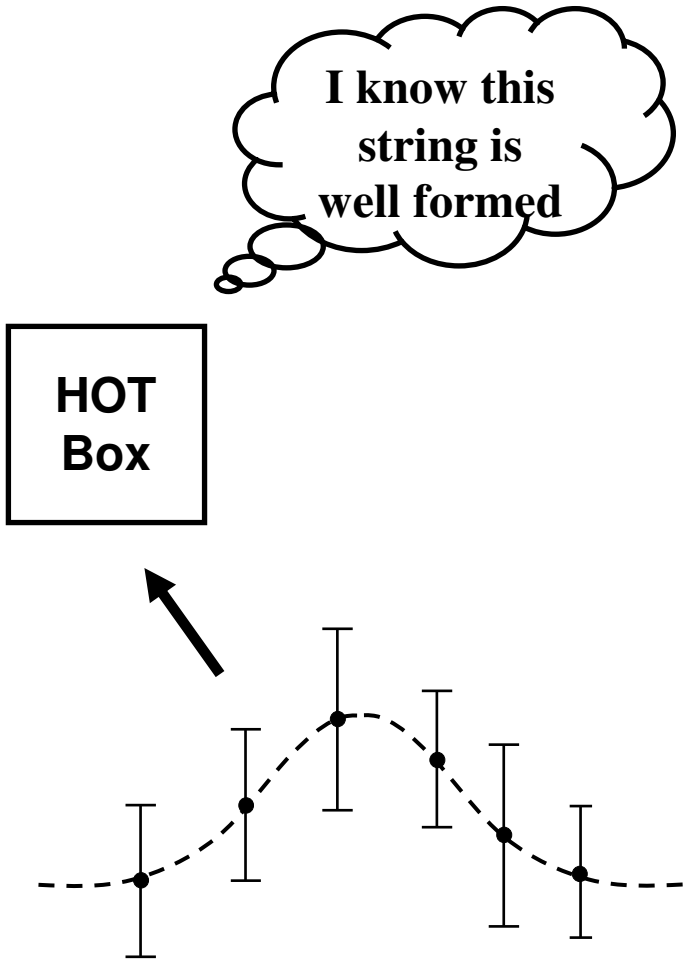
- Familiarity can initially influence responding without awareness.
- Confidence emerges as knowledge of the distribution of familiarity increases.
- This calibration process can be conceptualised as the transition from objective to subjective probability.



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