Experimenting on words in the mind

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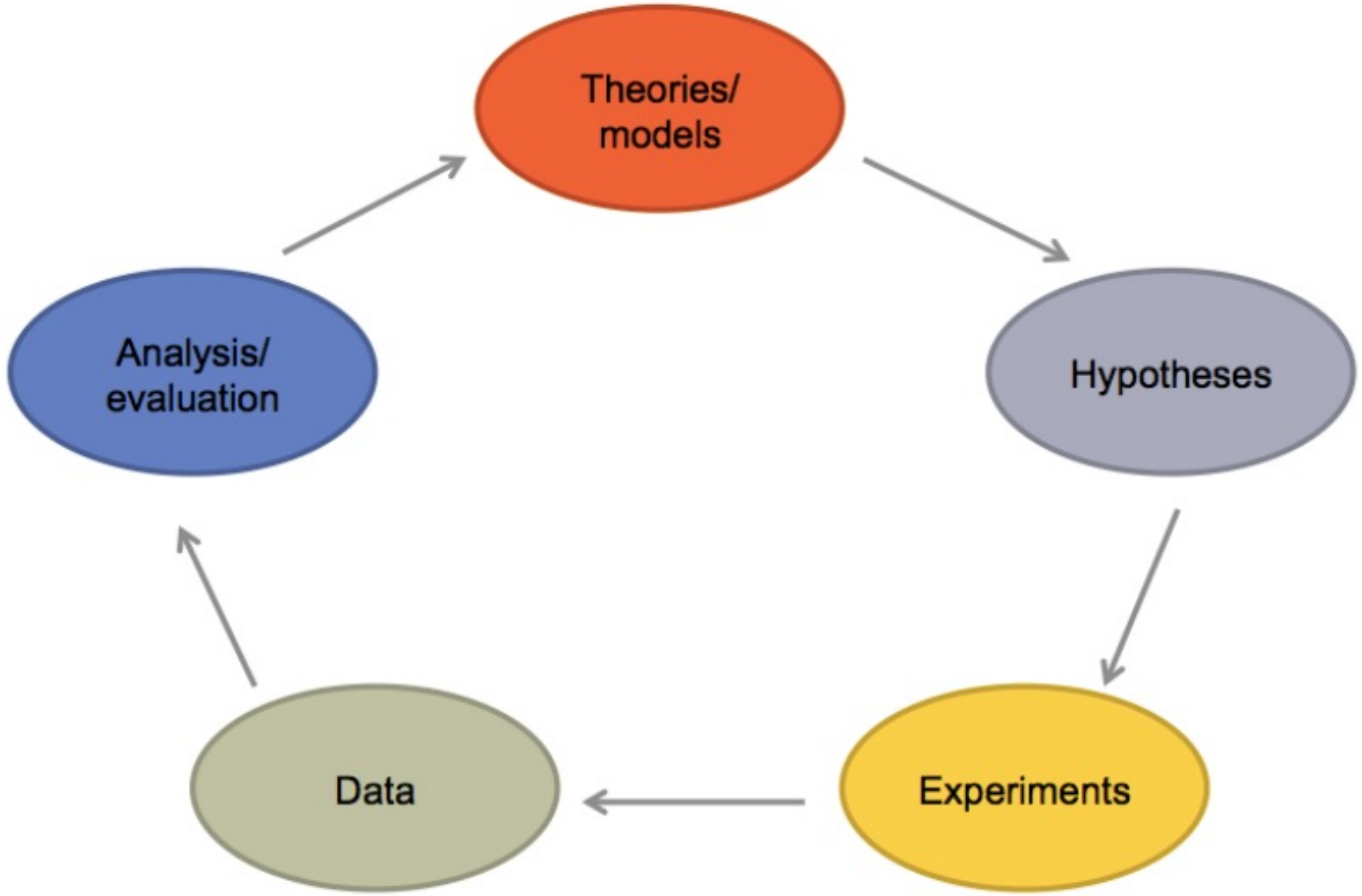
SS 2026

Run an experiment…

- Experimentation is a crucial pillar of scientific work
  - Especially in the psychological disciplines (i.e., linguistics)
- Test linguistic theories, models, research hypotheses
- Choice of a methodological approach = commitment to a particular experimental design
  - Experimental procedures are highly standardized
  - Replicability
- Experiments are becoming more popular in linguistics
  - Cornerstone of psycholinguistics

Completing the cycle



Testing word memory

- Words are one of the most commonly used set of stimuli in cognitive and experimental psychology (Balota et al., 2007)
- Variety of different experiments
  - Neuropsychology (fMRI, EEG)
    - Identify brain regions of activity
  - Physiological reactions (blood pressure, pupil diameter)
    - e.g. emotion words
  - Cognitive/ behavioral experiments
    - Word recognition
    - Word production
  - Behavioral experiments are popular (fewer costs, easier to recruit participants…)
    - Well suited to study lexical access

What facilitates word recall?

- models of word recognition differ in basic architecture
  - Cohort Model, NAM…
- but all include mechanisms to explain why some words are identified more quickly and accurately than others
  - E.g. Luce, Goldinger, Auer, & Vitevitch, 2000; Luce & Pisoni, 1998)
- most well-established factor that predicts word identification accuracy → **<u>lexical frequency</u>**
  - frequency with which the word occurs in language
  - frequent words are identified more quickly and accurately than rare words (Brysbaert & New, 2009; Savin, 1963)

Similarity neighbors

- second factor that robustly predicts word recognition
- perceptual similarity of the stimulus word to other words in the mental lexicon
- models of recognition assume activation of multiple lexical candidates ("neighbors") in memory
  - lexical competition → candidates compete with one another for recognition
- due to lexical competition, words with many neighbors are identified more slowly and less accurately than words that have fewer neighbors (Luce & Pisoni, 1998; Vitevitch & Luce, 2016)

Interaction effects

- In addition, frequency appears to modulate the effects of lexical competition
  - words with more high-frequency neighbors are recognized more slowly and less accurately than words with many low-frequency neighbors (Luce & Pisoni, 1998)

- Lexical frequency increases lexical competition
  - High-frequency, dense neighborhoods → most extreme competition
  - Low-frequency, sparse neighborhoods → weakest competition

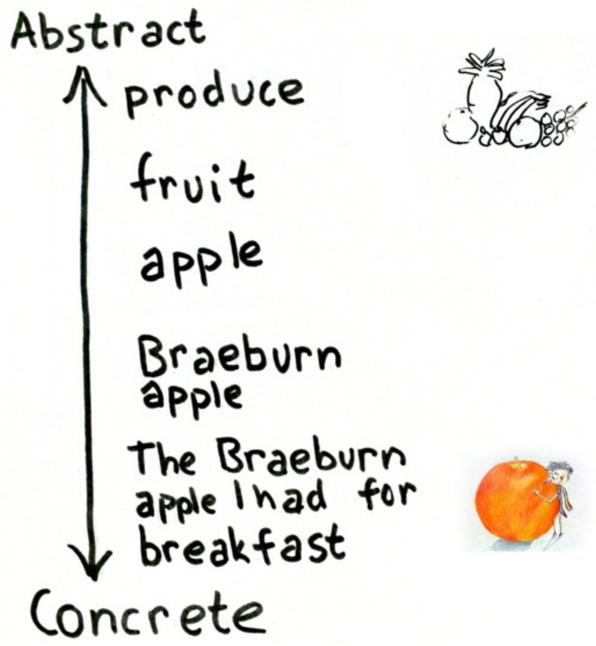
- Phonetic similarity increases lexical competition
  - *ghost-coast* vs. *ghost-most*

Experimentation

- To elicit the effect of a variable of interest
- While taking into account variables that are known to have an effect on lexical processing
  - Psycholinguistics does not work without control variables!

- Are concrete words recognized faster than

abstract words?
  - More accessible semantic concept for concrete words
  - facilitates their recognition
  - **Concrete**: chair, table, pen….
  - **Abstract**: honesty, kindness…



Hypothesis: Concreteness influences speed of word recognition

- Variable of interest = concreteness rating of a word
  - Measured on a scale (e.g., 0/1, or 1-5)
- Consider the effects of semantic neighborhood density, phonological neighborhood density, and word frequency
    - Weigh how many controls make sense

	Trunk	Crate	Truth	Grace
Lexical frequency	19.8	4.1	192.2	42.3
Sem. neighbors	5	4	52	13
Phon. neighbors	4	16	9	21

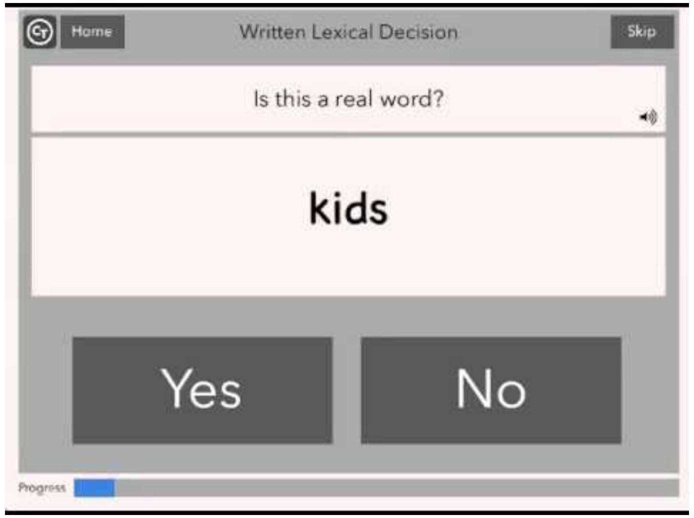
see: https://inetapps.nus.edu.sg/aelp/

Lexical decisions

- straightforward way to investigate word processing in a laboratory setting is to compare how words are perceived relative to pseudowords (or non-words)
  - phonotactically legal in a language and could thus technically be a word, but are not (e.g., *flyke* or *dobry* in English)
  - well-established "lexicality effect" → words are recognized more quickly and more accurately than pseudowords (Reicher, 1969; Taft, 1986; Wheeler, 1970)

one of the most widely used tasks that captures this effect is the **lexical decision task (LDT)**

- participants indicate whether items are real words or not (i.e., they make a lexical decision)
- \- in this paradigm, participants "respond as quickly and accurately as possible", with the items presented auditorily or visually, as spoken input or print



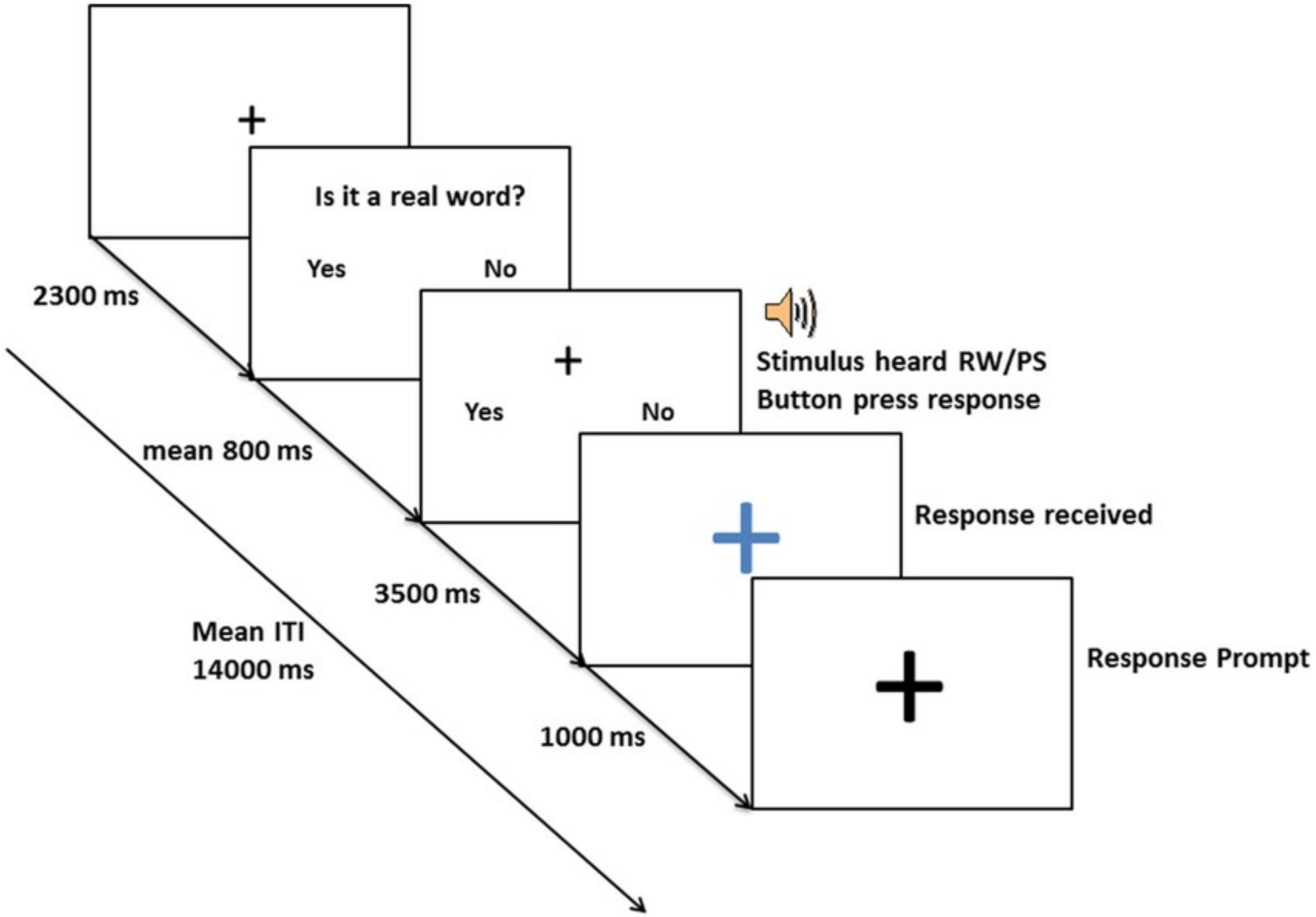
Spoken word recognition

- **Auditory lexical decision task (ALD)**
  - Identify if a word is a real word or a non-word (’*frup*’)
    - Press a button (yes/no) within certain time period
    - Reaction time measured from end of (auditory) presentation of word to button push
- According to hypothesis, concrete words are reacted to faster (=are recognized faster as real words) than abstract ones
- Test the difference in reaction times
  - Statistical differences

	RT concrete	RT abstract
1	0.005	0.03
2	0.07	0.1
3	0.009	0.1

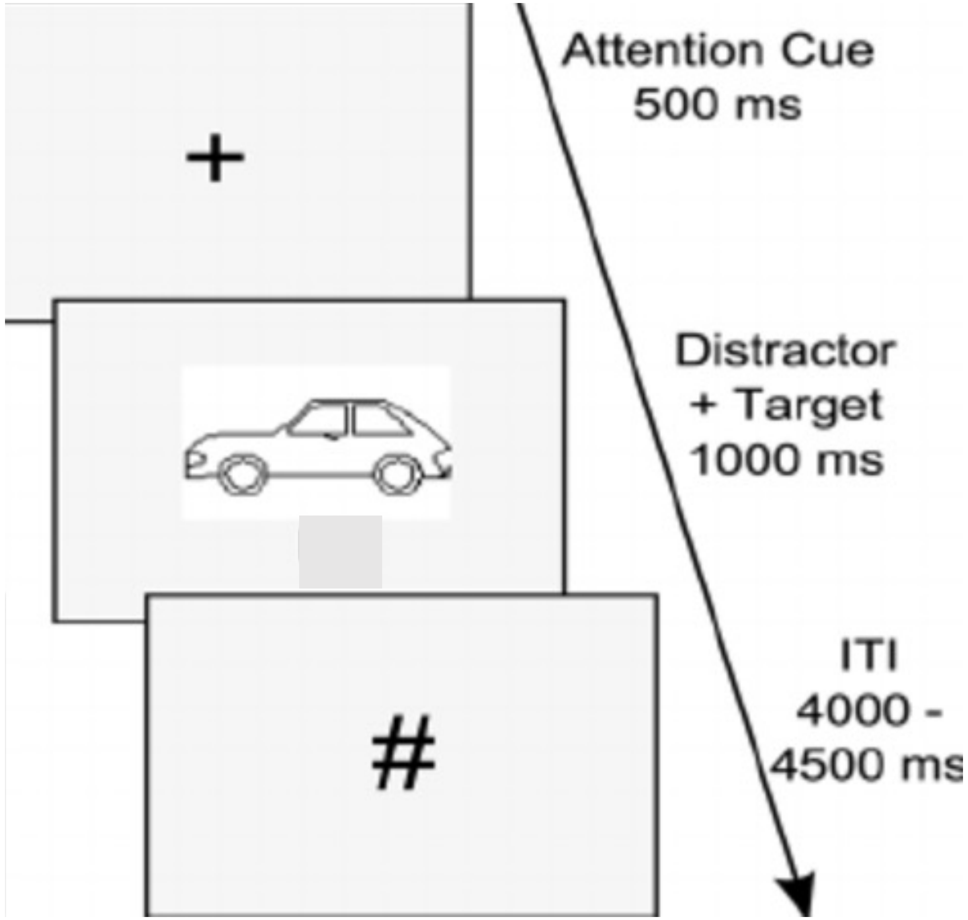
Example

- http://www.intro2psycholing.net/experiments/audio/aud_expt_index.php



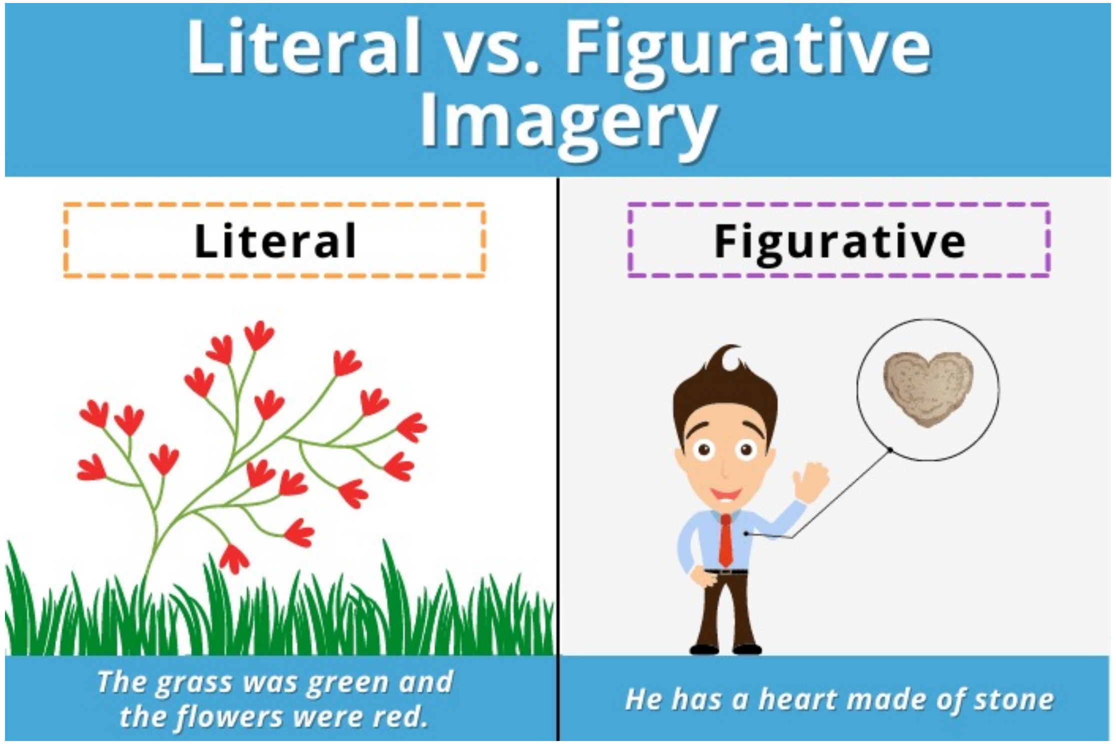
Reaction time measurements

- Measure participants' reaction times in a task
- For instance, picture naming task
  - picture is shown for some time – participants have to say the name as quickly as possible
    - after 4.5 seconds –recorded as no response
  - measure time from the appearance of the picture on the screen to speech onset
    - Specialized programs (E-Prime…)
    - Speech recorder, ppt with quiet beep when word appears
- Relatively simple



Auditory lexical processing paradigm

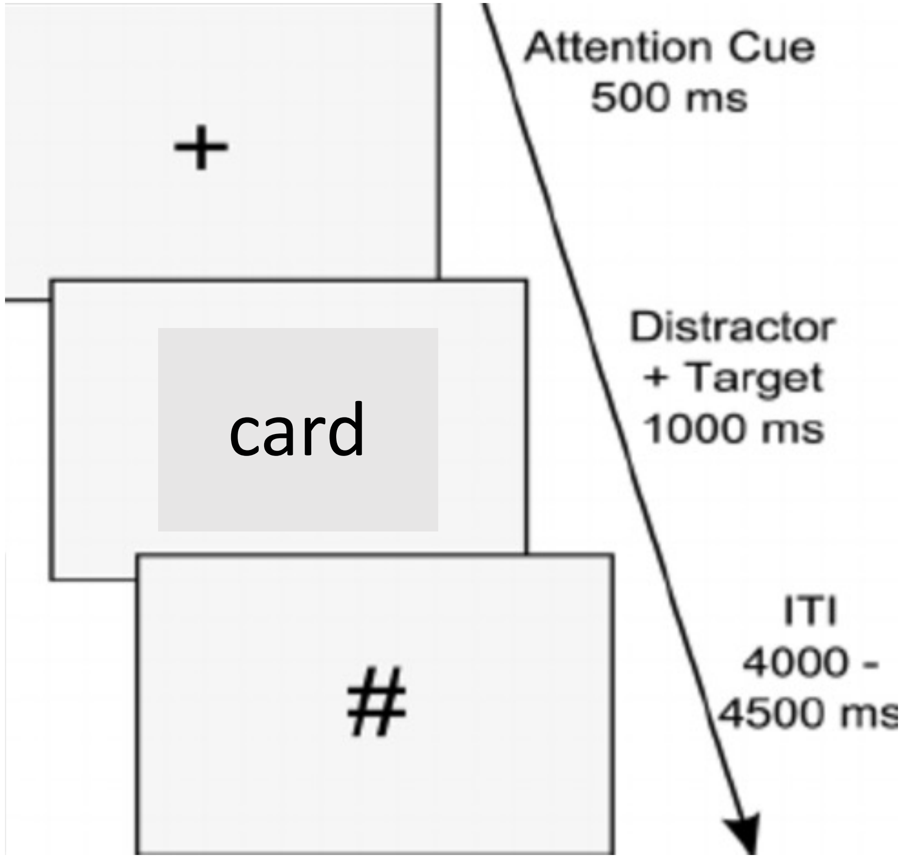
- used to study
  - basic processes in word recognition
  - nature of the mental lexicon
  - effects of word frequency
  - neighborhood effects
    - Far & near neighbors
  - various other phenomena of isolated word perception
    - Concreteness of words
    - Imagery
    - Familiarity
    - Age of acquisition
    - Word length
    - Phonotactic probabilities…



Visual word recognition

- Visual lexical decision task
  - With or without frequency effects
- Decide if real or non-word
  - Measure reaction time
- Focus is on printed word – graphemic analysis

  → orthographic neighbors: *strip – strib**
- *Is the word an accurately spelled English word?*



http://www.intro2psycholing.net/experiments/audio/aud_expt_index.php

Study 1: *"Effects of iconicity in lexical decision"*
Sidhu, Vigliocco, and Pexman, 2020, Language & Cognition, 12, 164-181

- relationship between the form of a word and its meaning is traditionally seen as arbitrary (e.g., Hockett, 1963)
  - no special link between a word's form (i.e., its orthography, phonology, or articulation) and its meaning
- Language can also be non-arbitrary via iconicity: a resemblance between form and meaning, in which aspects of a word's form map onto aspects of its meaning
- phonological iconicity, wherein a word's phonological form maps onto meaning
  - Onomatopoeia (quack, boom, sizzle)
  - Sound symbolism (vowels /ɪ/ and /ɑ/ associated with smallness and largeness (Lockwood & Dingemanse, 2015) → "shrimp" is small
- Most words fall on a spectrum from arbitrariness to iconicity
  - *Quack* = duck in English, but different words in other languages (e.g., *mac* in Romanian)
  - Choice of 'quack' is somewhat arbitrary
- study examined whether the recognition of English iconic words is facilitated in a population of typical adults on a visual lexical decision task

Experiment

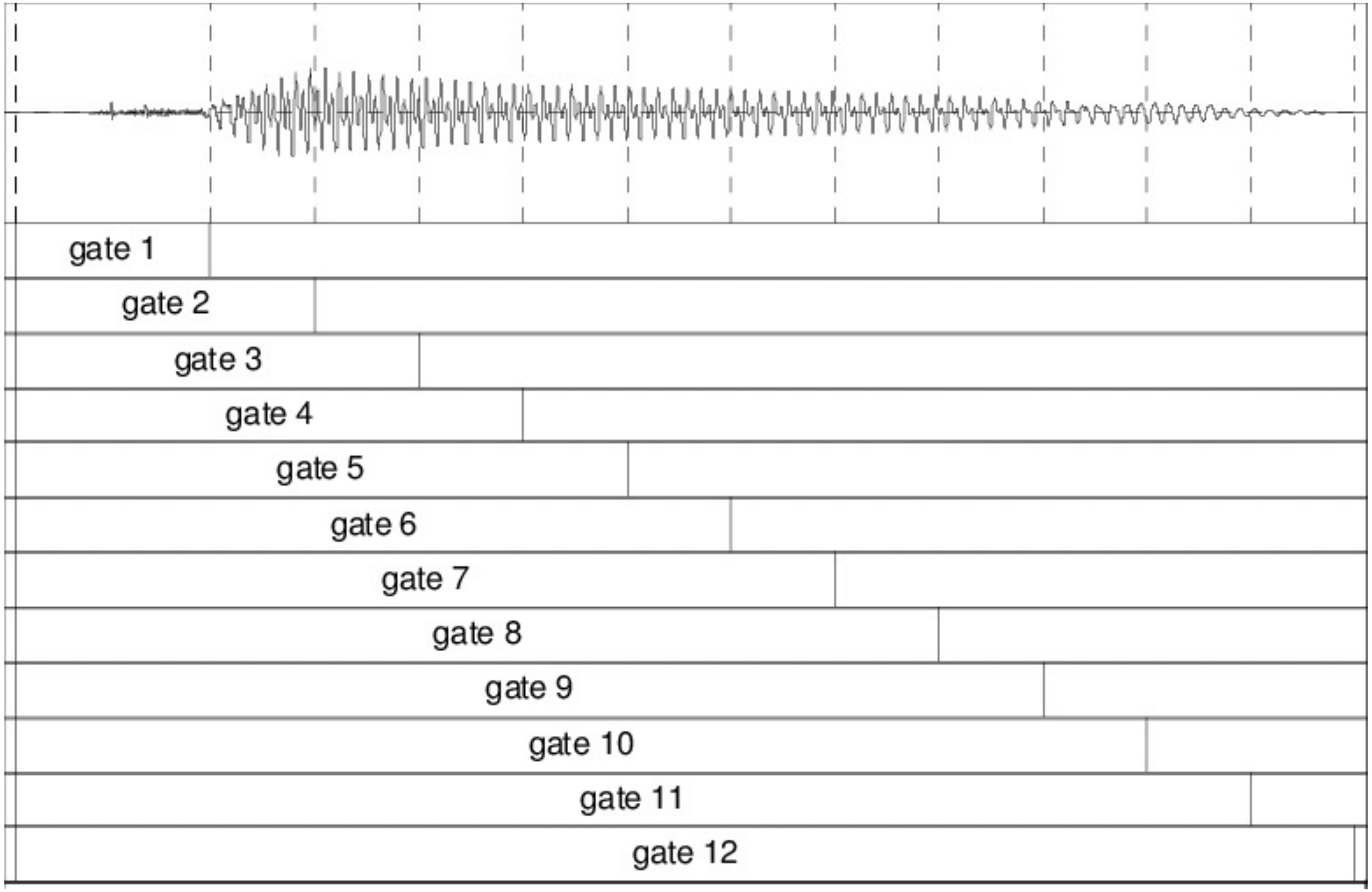
- Visual word presentation in lexical decision task
- Iconicity ratings by Perry et al. (2015), Winter et al. (2017)
  - words were rated on a scale from –5 (the word sounds like the opposite of its meaning) to 5 (the word was highly iconic), with 0 indicating that the word was arbitrary.
  - Included words in experiment: non-iconic, onomatopoeia, sound symbolism
  - Control variables: length, word frequency, number of morphemes, orthographic and phonological similarity (distance=1 bit), age of acquisition, concreteness
- Results: iconicity confers an advantage in lexical processing
  - *Participants were faster and more accurate when responding to words that were higher in iconicity. This suggests that iconicity does provide a benefit to word recognition*.
- Why? → onomatopoeia may be easier to identify as words
  - Possibly more intuitive when meaning and sound correspond
  - Strong link between semantics and phonology = boosts activation of a specific word
    - Result repeated in auditory lexical decision task

Spoken word recognition

- **Gating**
- a spoken language stimulus is presented in segments of increasing duration and subjects are asked to name the word and to give a confidence rating after each segment
  - E.g., *ba--ban--band--bands*
  - Initial segments crucial for word recognition (Cohort Model)
  - How large does the initial portion of the word have to be for recognition?
    - And for confidence in recognition
- unfavorable listening conditions place higher demands on working memory processing
  - participants are more vigilant
  - in bilinguals/ L2-learners: more cross-linguistic interference can occur
    - More reliance on “fall-back” first language when speech recognition is difficult

Example

- http://www.intro2psycholing.net/experiments/audio/aud_expt_index.php



Spoken word recognition

- **Identification in noise**
  - Background noises: e.g. white noise, talkers, nature sounds…
  - several different signal-to-noise ratios
- Unfavorable listening conditions
- Higher burden on lexical memory
  - Easier to identify words from connected speech when background noises, but isolated words are harder to recognize

- Test speech intelligibility under difficult conditions
  - Listeners pay more attention to signal
  - Listener's decision process and response biases when speech signal is degraded

- Experiment can be done with or without confidence ratings
- With or without nonsense syllables, non-words…

Study 2: *”The differential roles of lexical and sublexical processing during spoken-word recognition in clear and in noise”*

Strauß, Wu, McQueen, Scharenborg, & Hintz, 2022, Cortex, 151, 70-88.

- fundamental process that underlies speech perception is translating continuous acoustic cues into abstract representational units that allow access to meaning
  - listeners map the acoustic cues they perceive onto abstract, speech-specific sublexical representations (e.g., phonemes)
    - sublexical processing (below word level)
  - listeners also map these representations onto lexical representations, and onto semantic representations
- Lexical frequency rate impacts on lexical representations
- Phonotactic probability impacts on sublexical representations (phonemic level)
  - frequency with which a sublexical segment (e.g., a phoneme) or combinations of segments occur in a certain position within a word
- Study investigated whether listeners adjust their reliance on lexical- and sublexical-level processing in response to noise-induced uncertainty about the speech signal

Experiment

- Dutch participants carried out two experimental blocks
  - 1. they were presented with spoken Dutch words and non-words embedded in speech-shaped background noise
  - 2. in clear speech
- decide as quickly as possible whether the presented stimulus was an existing Dutch word or not, if yes: type it
- 160 monosyllabic Dutch words, CVC structure, recognition and uniqueness points after the third phoneme
  - Same number of non-words (non-word generator 'Wuggy', see Keuleers & Brysbaert, 2010)
- words varied substantially in word frequency and phonotactic probability
- Participants carrier out lexical decision task ('Is the spoken stimulus an existing Dutch word?')

Results

- Clear speech: recognition accuracy higher and RT shorter
- Effect of lexical frequency rate in both conditions
  - Reaction time increased for high frequency – increase in lexical competition
- In degraded speech signal → phonotactic probabilities play significant role
  - High probability = faster lexical processing
  - In masked condition sublexical processing is weighted more strongly (Mattys et al., 2009)
- Finding:
- *While lexical information (i.e., frequency) appears to play a mandatory role in spoken-word recognition (i.e., both in clear and in noise), phonotactic probability may provide a 'helping hand' in cases where the speech signal is less reliable (masked).*

Visual word recognition

- Progressive demasking
  - Word is gradually exposed from behind a mask
  - i.e., the signal-to-noise ratio increases
- Perceptual identification task using degraded stimulus presentation procedures, but with the advantage of providing response time (RI) measures on each trial
- participants indicate quickly when they think they have identified the word and type it in
  - With or without confidence ratings

- http://www.intro2psycholing.net/experiments/audio/aud_expt_index.php

Progressive demasking

- PDM conditions slow down word recognition (Grainger and Segui, 1990)
  - makes the task sensitive to factors affecting the early stages of visual word recognition (word length, first phoneme/letter)
- paradigm is sensitive to influence of orthographic neighborhood on word recognition (Carreiras, Perea, & Grainger, 1997; Grainger & Segui, 1990; Perea & Carreiras, 1995; Snodgrass & Mintzer, 1993; van Heuven, Dijkstra, & Grainger, 1998)
  - ’orthographic neighbors’ are the set of different words that can be created by changing one letter of the word while maintaining letter positions
    - Levenshtein distance/ string distance with graphemes
- PDM task represents a pure measure of orthographic word processing (see Carreiras et al., 1997)
  - L2 orthographic word identification (Lemhöfer et al., 2008)

Progressive demasking

- Core assumption of models of visual word recognition (e.g., Chen & Mirman, 2012) → competition between orthographic similar word representations
    - orthographic neighbors differing by one grapheme (*lift* - *left*)
    - deletion neighbor → *cat* - *at*
  - Many orthographic neighbors slow down lexical identification
  - Neighborhood frequency effect → higher frequency neighbors are often mis-selected
    - E.g., instead of *lime* - *line*
- PMD is particularly sensitive to orthographic competition
  - the higher-frequency neighbor may be selected and reported, rather than the word presented (Grainger & Segui, 1990)

Word production

- Picture naming
  - Participants say word as fast as possible
  - Remember: word production facilitated by dense neighborhood
    - More accurate phonetics
- Stroop Task
  - Interference in domains: meaning & color of word
  - Facilitation when congruence in color and meaning
  - People cannot ignore the semantic meaning of isolated words.
    - when a word appears on a screen, people recognize it as a word and automatically access its semantic meaning
  - Tests cognitive inhibition to simultaneously recall information from different domains

YELLOW

YELLOW

BLUE

GREEN

GREEN

Stroop word

- Experimental paradigm for over 70 years
- Display color is varied across trials, so that sometimes the trial is congruent (e.g., RED written in red ink) and sometimes it is incongruent (e.g., RED written in blue ink). Interference is measured by subtracting congruent from incongruent reaction times
- Any differences between congruent and incongruent trials cannot be due to lexical differences in the stimulus words (because they are the same)
    - must be due to differences in the color's being congruent or incongruent with the semantic meaning of the word, because the same words appear in the congruent and incongruent lists
- Burt (2002) demonstrated a word frequency effect
    - low-frequency words produce longer color naming latencies than high-frequency words do
        - slowdown to process the low-frequency words spills over to color-naming performance
- *Emotional Stroop Test*
    - color name words which are either meaningless strings, neutral words, words indicating negative affect, and those indicating positive affect
        - Show more or less emotional intensity of words, e.g. in L1 and L2 ("arousal effect")

Study 3: *"Visual attention and lexical involvement in L1 and L2 word processing: Emotional Stroop Effect"*

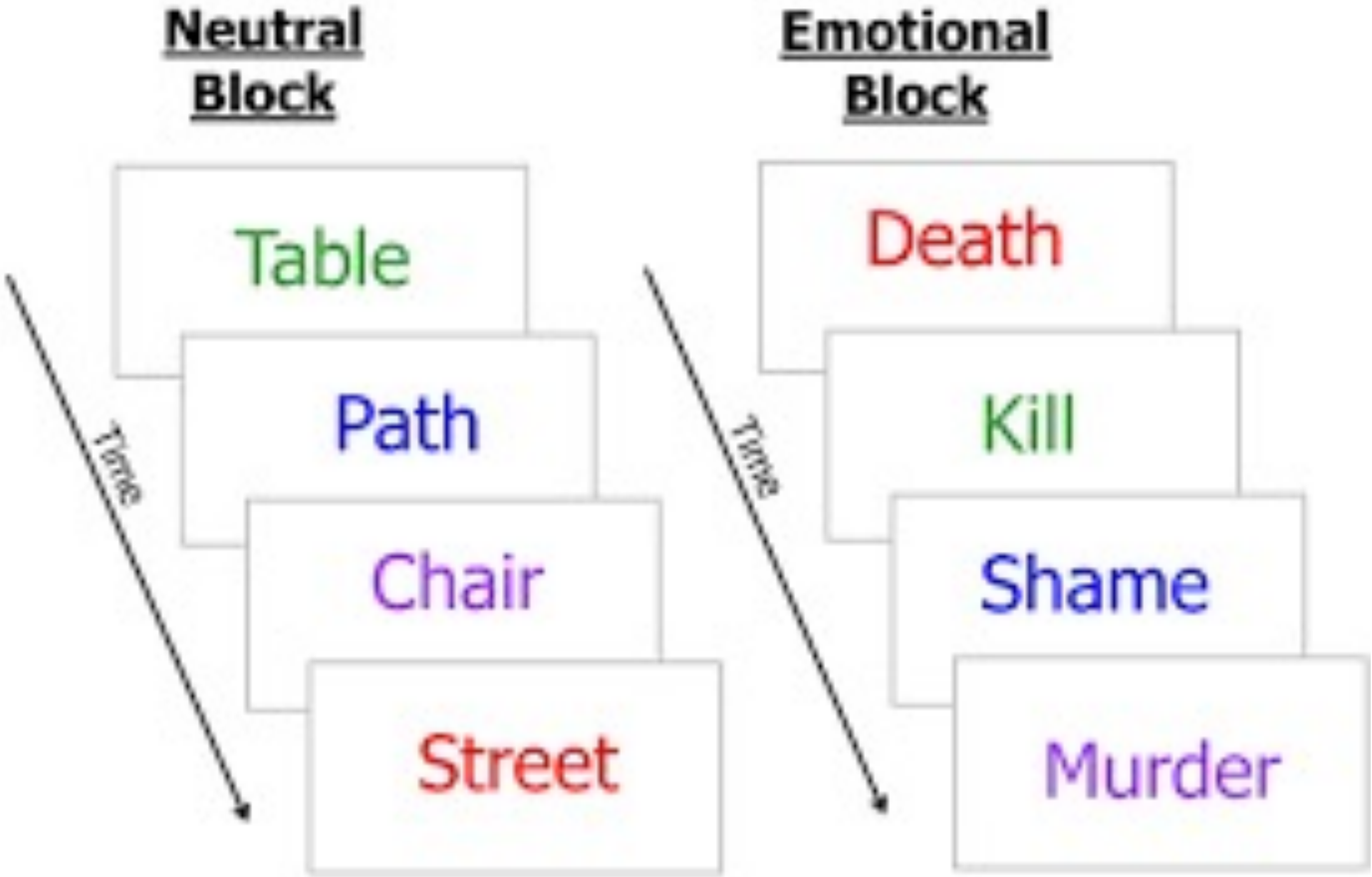
Hamedi & Pishghadam, 2020, J Psycholing Res, 50, 585-602.

- Investigate the emotional valence of the stimuli by examining the respondents' reaction time to name the colors of emotionally charged words (e.g., WAR, CANCER, KILL) and neutral stimuli (e.g., CLOCK, PENCIL, BOOK)
  - Longer reaction time before color is named = more interference from semantics → more attention is paid to semantics of words (high attentional-lexical engagement)
- longer fixation = deeper lexical processing and attentional engagement
- Assumed higher lexical engagement in L1 than in L2
  - More emotional reaction to L1 words
- Negativity bias: we pay more (lexical) attention to negative events/ things
  - Well-described phenomenon in psychology

- **Task**:

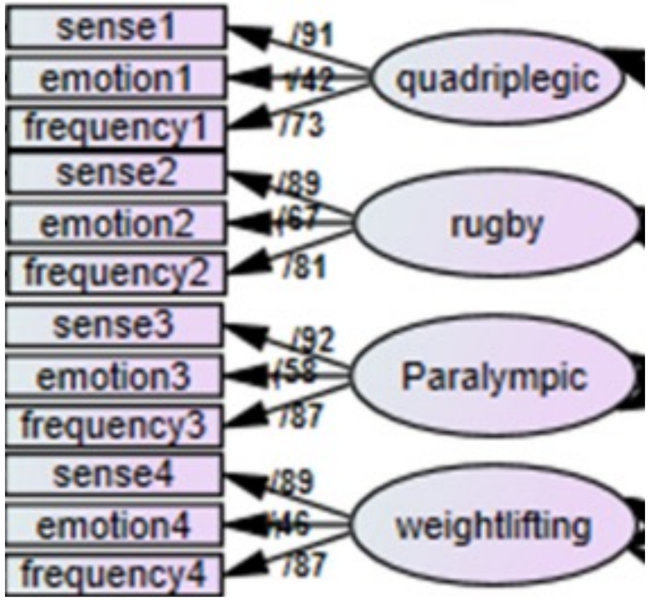
Name colors as quickly as possible

- Meaning interferes
- More interference in L1
- More lexical engagement in L1



Experiment

- Persian L1, English L2 (intermediate)
- different types and measures of emotional content:
  - No emotion (0), Auditory emotion (1), Visual emotion (2), Kinesthetic emotion (3), Inner Emotion (4), and Arch Emotion (5)
  - Words controlled for word frequency, context, emotional sense
  - 4 different colors were tested
- Respondents pressed the “z” key on the keyboard if the word appeared in red; the “x” key with their left index finger if the word was presented in blue, etc.
  - Also possible to have respondents name the words and measure RT from presentation to naming
- <u>Results</u>: more lexical engagement in L1
  - Longer RT in L1 when emotionally charged word
    - “Negativity bias”
- empirical evidence for the relationship between lexical involvement and semantic engagement in first and second languages



Psychonomic Bulletin & Review
2008, 15 (5), 956-960
doi: 10.3758/PBR.15.5.956

The role of valence and frequency in the emotional Stroop task

Todd A. Kahan and Charles D. Hely
Bates College, Lewiston, Maine

People are generally slower to name the color of emotion-laden words than they are to name that of emotionally neutral words. However, an analysis of this emotional Stroop effect (Larsen, Mercer, & Balota, 2006) indicates that the emotion-laden words used are sometimes longer, have lower frequencies, and have smaller orthographic neighborhoods than the emotionally neutral words. This difference in word characteristics raises the possibility that the emotional Stroop effect is partly caused by lexical rather than by emotional aspects of the stimuli—a conclusion supported by the finding that reaction times to name the color of low-frequency words are longer than those for high-frequency words (Burt, 2002). To examine the relative contributions of valence and frequency in color naming, we had 64 participants complete an experiment in which each of these variables was manipulated in a 3 × 2 factorial design; length, orthographic neighborhood density, and arousal were balanced. The data indicate that valence and word frequency interact in contributing to the emotional Stroop effect.

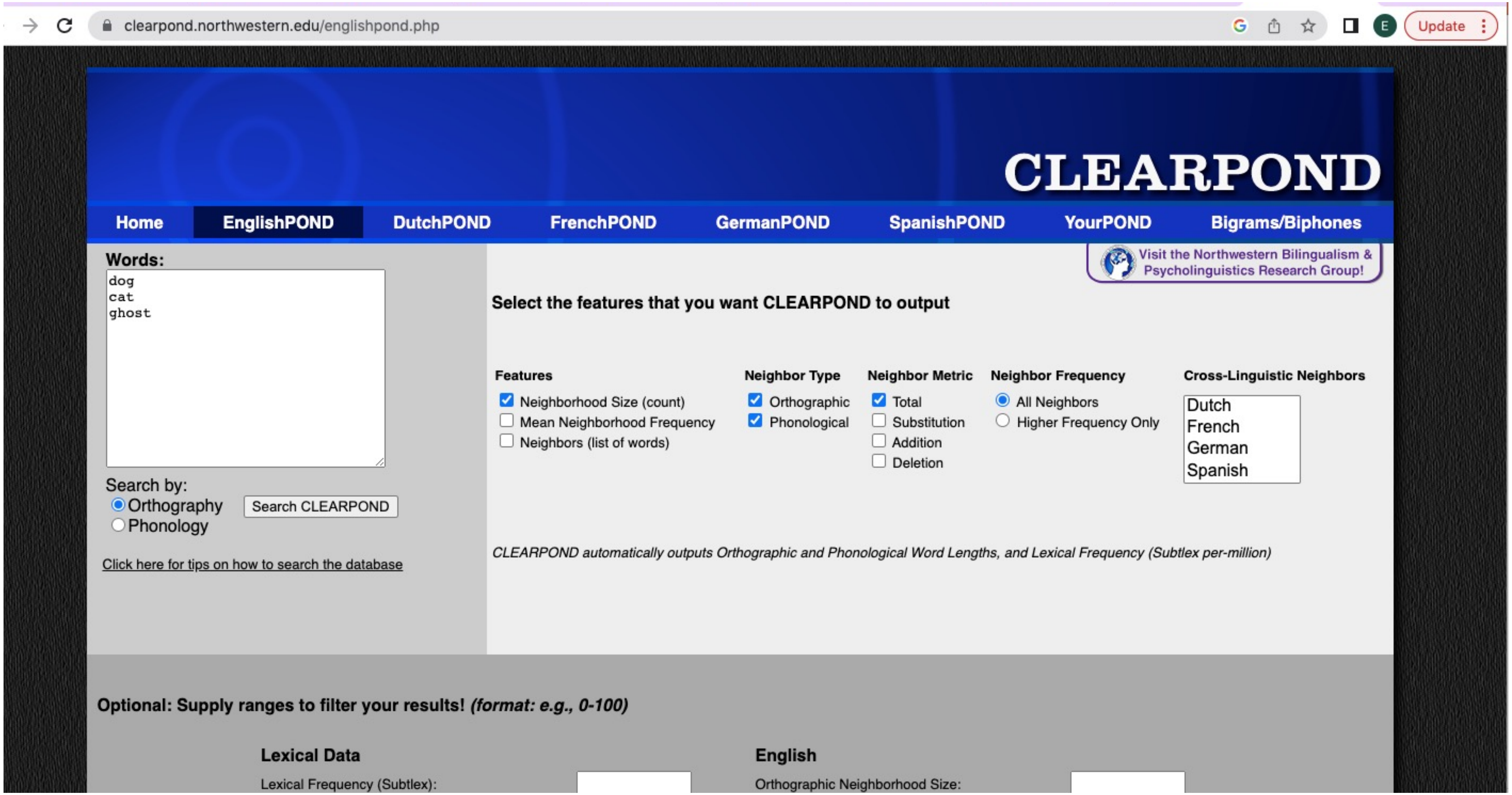
APPENDIX

Word	Valence	Kučera–Francis Frequency	Word	Valence	Kučera–Francis Frequency
alone	negative	high	coin	emotionally neutral	low
broken	negative	high	cork	emotionally neutral	low
crisis	negative	high	doll	emotionally neutral	low
dead	negative	high	hammer	emotionally neutral	low
death	negative	high	owl	emotionally neutral	low
failure	negative	high	pungent	emotionally neutral	low
hell	negative	high	scissors	emotionally neutral	low
lie	negative	high	swamp	emotionally neutral	low
lost	negative	high	tease	emotionally neutral	low
pressure	negative	high	vanity	emotionally neutral	low
sick	negative	high	vest	emotionally neutral	low
dump	negative	low	art	positive	high
foul	negative	low	beauty	positive	high
loser	negative	low	dream	positive	high
maggot	negative	low	free	positive	high
massacre	negative	low	freedom	positive	high
poison	negative	low	nature	positive	high
rat	negative	low	nice	positive	high
scar	negative	low	progress	positive	high
torture	negative	low	soft	positive	high
trash	negative	low	wish	positive	high
wasp	negative	low	world	positive	high
body	emotionally neutral	high	cheer	positive	low
chance	emotionally neutral	high	circus	positive	low
coast	emotionally neutral	high	cuisine	positive	low
hit	emotionally neutral	high	cute	positive	low
hospital	emotionally neutral	high	humane	positive	low
manner	emotionally neutral	high	puppy	positive	low
news	emotionally neutral	high	thankful	positive	low
patient	emotionally neutral	high	toy	positive	low
ship	emotionally neutral	high	tune	positive	low
truck	emotionally neutral	high	wink	positive	low
wine	emotionally neutral	high	zest	positive	low

Word memory

- Recall words
- Test short-term and long-term memory
  - Present participants with a list of words or consecutive words over a few trials
    - Present words in list, individually, or in pairs
  - Have them record their memory (“write down all words you remember”)
    - Or say them out loud
    - In a certain period of time
- Phonological neighborhood density and lexical frequency facilitate word memory
- Manipulating word neighborhood frequency allows “false memory” condition
  - Target word is lowest frequency within its neighborhood
  - High likelihood that one of the high-frequency neighbors will be recalled
- Version: present words, then ask participants if a word was among the words
  - “Was ‘clog’ among the words?

Word frequency, neighborhood density



clearpond.northwestern.edu/clearpond_database.cgi

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CLEARPOND R

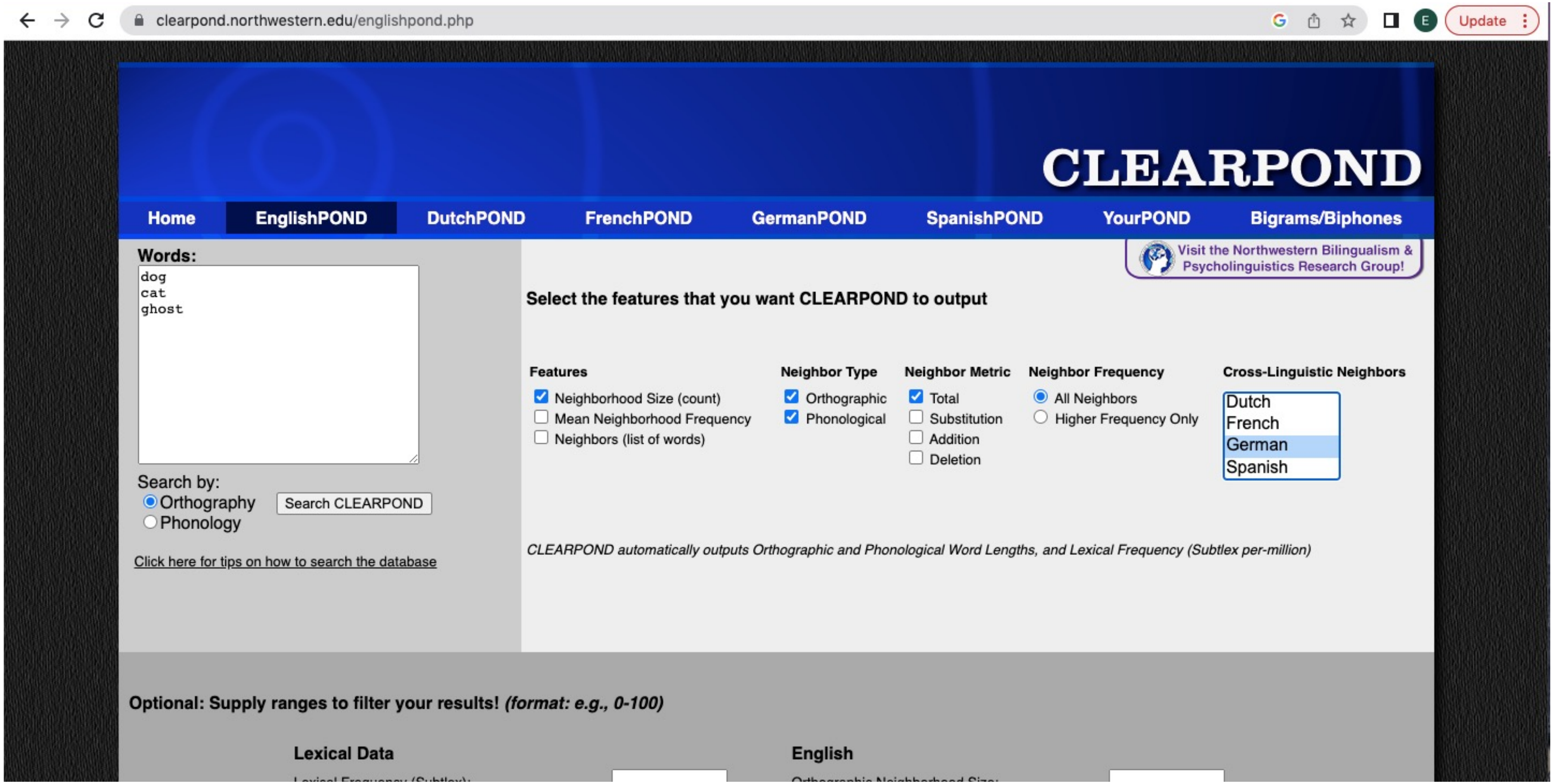
Right click and select 'Save As...' to save the data!

Word	PhoWord	Length (Ortho)	Length (Phono)	Freq (per-million)	OTAN	OTAW	PTAN	PTAW
dog	d.A.g	3	3	192.8431	20	don;Doc;dig;log;fog;dug;dot;Dom;hog;Doe;doo;jog;dos;bog;Dow;Dag;cog;do;dogs;Dong	25	don;Doc;dig;doll;dock;fog;dug;
cat	k.1.t	3	3	66.3333	33	can;car;eat;cut;fat;hat;cab;rat;sat;bat;cap;Pat;Cal;Cam;Nat;mat;Kat;cot;vat;tat;cad;gat;oat;Cag;caw;at;coat;cast;cats;chat;cart;cant;Scat	50	that;can;cut;catch;court;caugh
ghost	g.oU.s.t	5	4	36.5882	2	host;ghosts	14	most;guest;toast;post;coast;ho

Elapsed time: 1.13 sec

CLEARPOND: Cross-Linguistic Easy-Access Resource for Phonological and Orthographic Neighborhood Densities

Cross-language neighbors



German neighbors

Visit the Northwestern Bilingualism & Psycholinguistics Research Group!

	gOTAN	gOTAW	gPTAN	gPTAW
	10	Don;zog;log;Dom;dos;DOD;wog;Sog;OG;Doug	0	
Cag;gnat;at;cast;cats;cattle;cant;cashed;Scat;capped;caste;catty	7	hat;tat;Rat;bat;Kat;Cut;Cato	9	Code;Keith;Kid;Kat;Kit;Cut;Kitt;Kot;kaut
	0		4	gehst;Geist;Gast;gießt

Concreteness ratings

Springer Link

Home > Behavior Research Methods > Article

Published: 19 October 2013

Concreteness ratings for 40 thousand generally known English word lemmas

Marc Brysbaert, Amy Beth Warriner & Victor Kuperman

Behavior Research Methods **46**, 904–911 (2014) | Cite this article

Abstract

Concreteness ratings are presented for 37,058 English words and 2,896 two-word expressions (such as *zebra crossing* and *zoom in*), obtained from over 4,000 participants by means of a norming study using Internet crowdsourcing for data collection. Although the instructions stressed that the assessment of word concreteness would be based on experiences involving al senses and motor responses, a comparison with the existing concreteness norms indicates tha participants, as before, largely focused on visual and haptic experiences. The reported data set is a subset of a comprehensive list of English lemmas and contains all lemmas known by at

So, we ask you to use a 5-point rating scale going from abstract to concrete and to use the letter N when you do not know the word well enough to give an answer.

Abstract (language based)			*Concrete (experience based)*	
1	*2*	*3*	*4*	*5*
N = I do not know this word well enough to give a rating.				

A concrete word comes with a higher rating and refers to something that exists in reality; you can have immediate experience of it through your senses (smelling, tasting, touching, hearing, seeing) and the actions you do. The easiest way to explain a word is by pointing to it or by demonstrating it (e.g. To explain 'sweet' you could have someone eat sugar; To explain 'jump' you could simply jump up and down or show people a movie clip about someone jumping up and down; To explain 'couch', you could point to a couch or show a picture of a couch).

Semantic neighborhood/ primes

Welcome to the University of South Florida Free Association Norms

Douglas L. Nelson and Cathy L. McEvoy

University of South Florida

Thomas A. Schreiber

University of Kansas

What this site provides:

1. Introductory essay on these free association norms (260K)
2. The Database (38 MB)
   - Appendix A. The normed cues, their targets and related information
   - Appendix B. Have a target word, need a cue or a prime?
   - Appendix C. N x N matrices showing network connections
   - Appendix D. Normed words and their idiosyncratic responses
   - Appendix E. Accessibility Index
   - Appendix F. Norms for rhyme, assonance, and fragment cues

How to cite these norms in your references:
Nelson, D. L., McEvoy, C. L., & Schreiber, T. A. (1998). The University of South Florida word association, rhyme, and word fragment norms. http://www.usf.edu/FreeAssociation/.

CD availability:
We will make a CD available to those who are interested. Please contact Douglas Nelson: nelson@luna.cas.usf.edu, or Department of Psychology, University of South Florida, Tampa, FL 33620, or (813) 974-2839

The purpose of this WEB site is to make the largest database of free association ever collected in the United States available to interested researchers and scholars. More than 6,000 participants produced nearly three-quarters of a million responses to 5,019 stimulus words. Participants were asked to write the first word that came to mind that was meaningfully related or strongly associated to the presented word on the blank shown next to each item. For example, if given BOOK _________, they might write READ on the blank next to it.

DAILY	FSG
WEEKLY	0.200.
EVERYDAY	0.100.
MONTHLY	0.070.
ROUTINE	0.070.
HABIT	0.020.
ATTENDANCE	0.020.
OFTEN	0.010.
NEWSPAPER	0.010.
NO. OF CUES:	8

DAIRY	FSG
CHEESE	0.030.
BUTTER	0.010.
MILK	0.010.
NO. OF CUES:	3

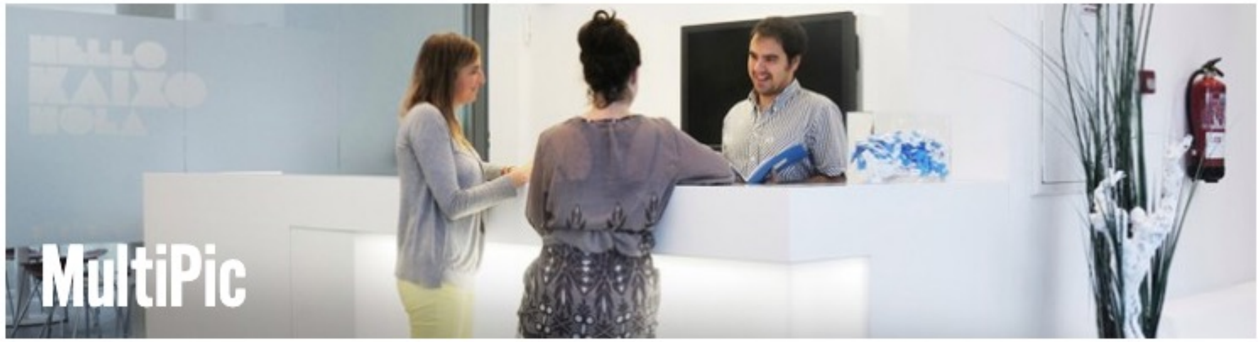
DAISY	FSG
FLOWER	0.060.
DANDELION	0.020.
MISS	0.010.
FIELD	0.010.
NO. OF CUES:	4

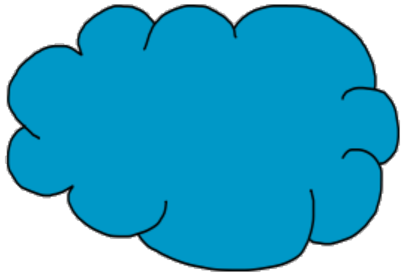
DAM	FSG
BEAVER	0.270.
OVERFLOW	0.030.
FLOOD	0.010.
NO. OF CUES:	3

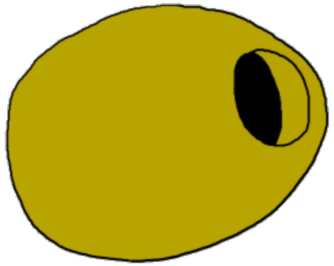
DAMAGE	FSG
DESTROY	0.060.
DENT	0.040.
ESTIMATE	0.020.
PROPERTY	0.020.
RUIN	0.020.
WRECK	0.020.

Multipic Database (English, German)

bcbl
BASQUE CENTER
ON COGNITION, BRAIN
AND LANGUAGE







MultiPic

A standardized set of 750 drawings with multilingual norms

containing naming norms and familiarity scores for 500 coloured pictures, in thirty-two languages or language varieties from around the world, also graphic complexity scores

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