

# The ABCDs of Personality and the Problem of Categorization

Part of a Symposium:  
Categorisation, Decision-Making and Personality

(Luke D Smillie & William Revelle, organizers)  
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William Revelle  
Northwestern University

# The ABCDs of Personality

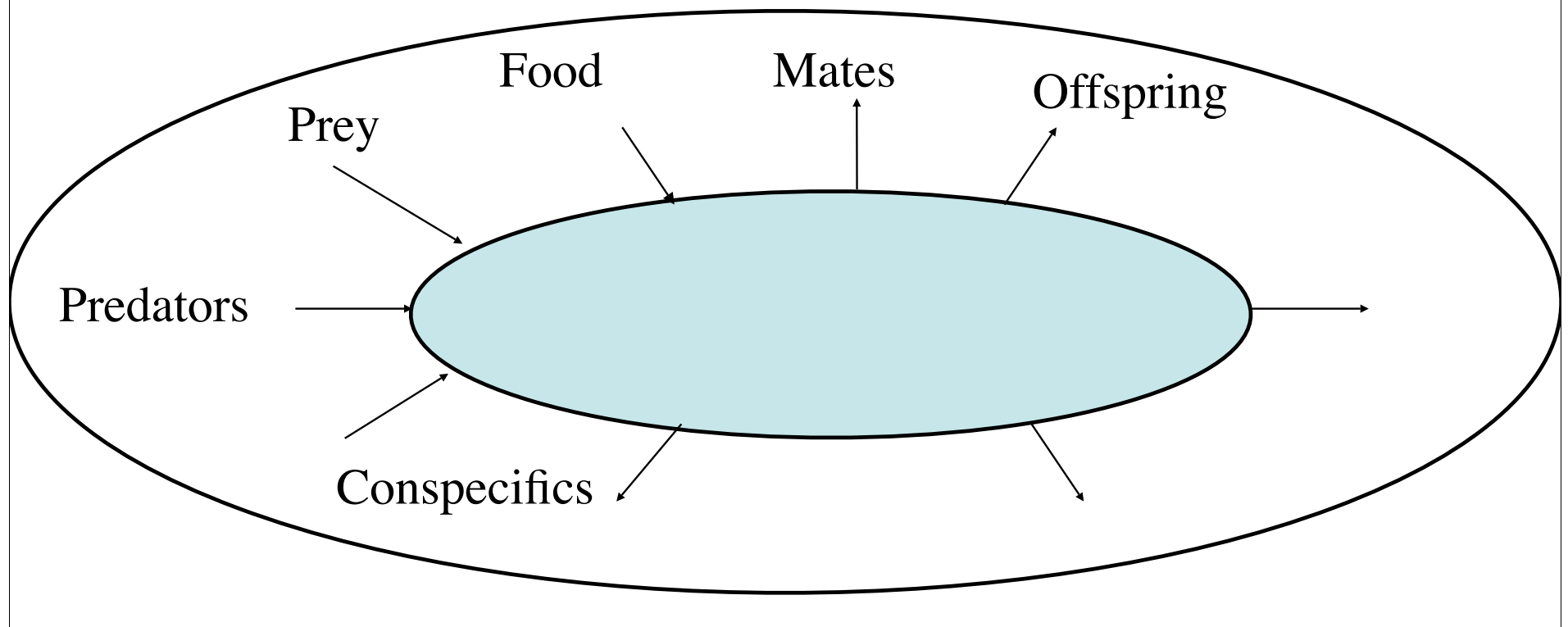
An important evolutionary challenge is to detect and attain food while avoiding becoming food. More generally, this is the problem of approaching rewards and avoiding punishments. Structural models of affect distinguish between dimensions of positive and negative affect; contemporary personality theories organize traits in terms of abilities to detect and achieve benefits or rewards while avoiding costs or punishment. (E.g., Reinforcement Sensitivity Theory examines this challenge in terms of a) individual differences in sensitivity to cues for reward and punishment and b) in terms of behavioral activation (either approach or withdrawal) and behavioral inhibition.)

By examining the interrelationships of Affect, Behavior, Cognition, and Desires (the ABCDs of personality), we are able to tease apart the ways in which stable personality traits (e.g., E & N) reflect patterns in how current affective states and long term desires combine to affect the cognitive representation of the environment. I will review prior work on personality and categorization and discuss how focusing on the cognitive and affective aspects of specific learning and judgment tasks allows for a richer understanding of the basis of personality traits.

# The Evolutionary Challenge in Lewinian Space:

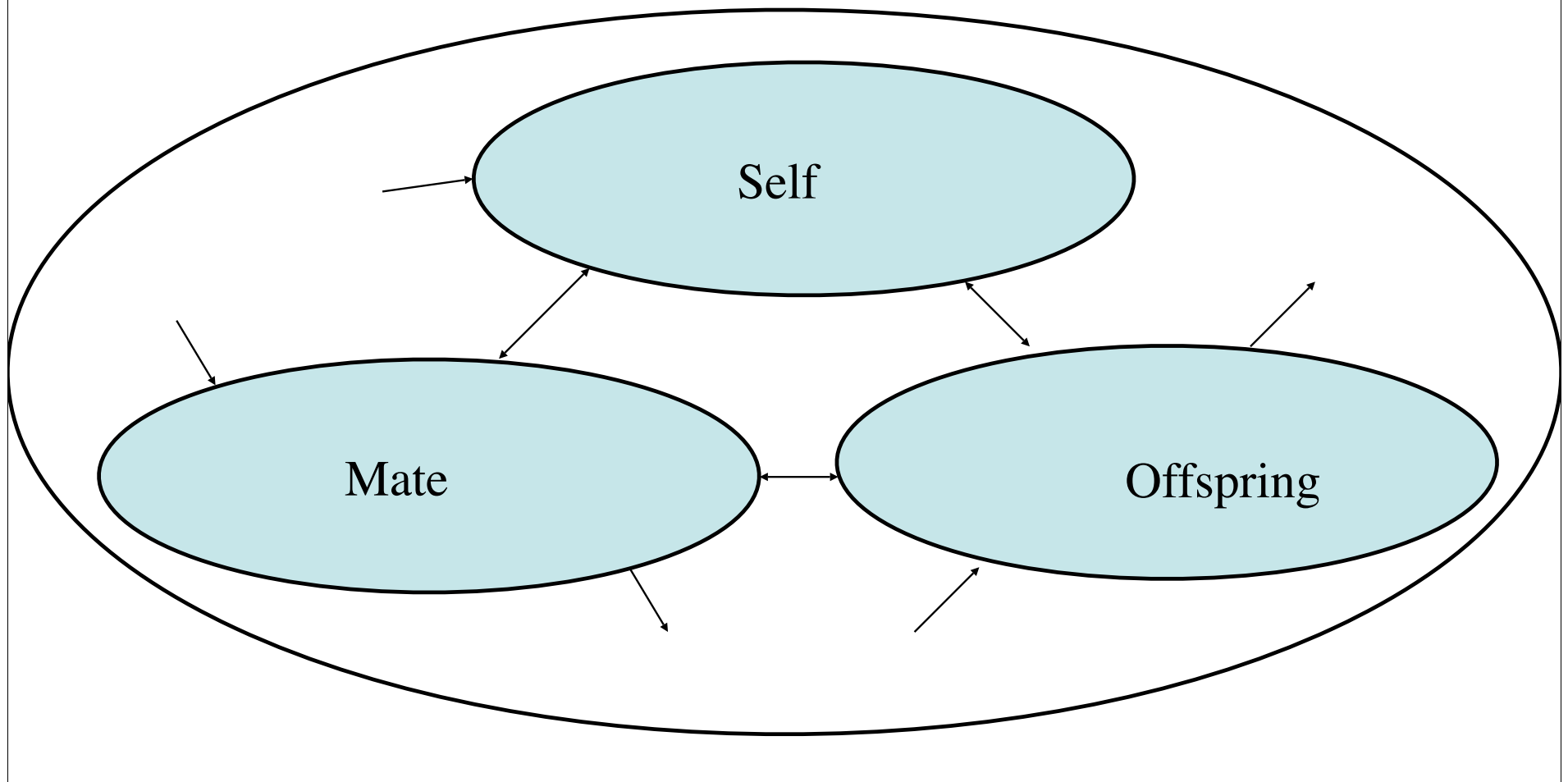
## Internal and External Worlds

An individual interacts with the world



# The Evolutionary challenge in Lewinian Space: Internal and External Worlds

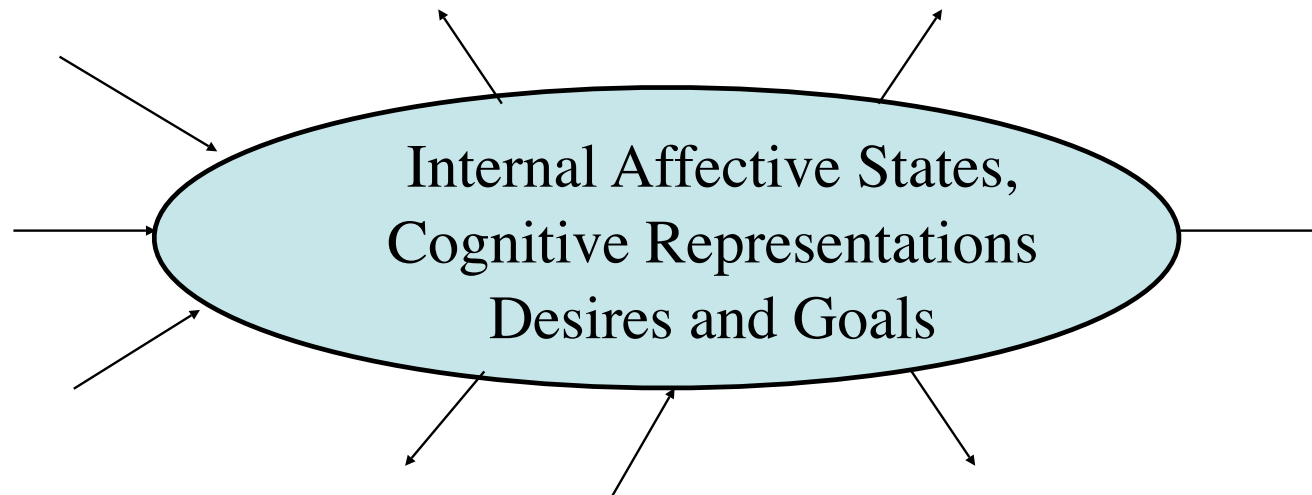
## Multiple individuals interacting



# Focus on one individual's interactions with the world

External Cues

Organismic actions



# Personality and the ABCDs

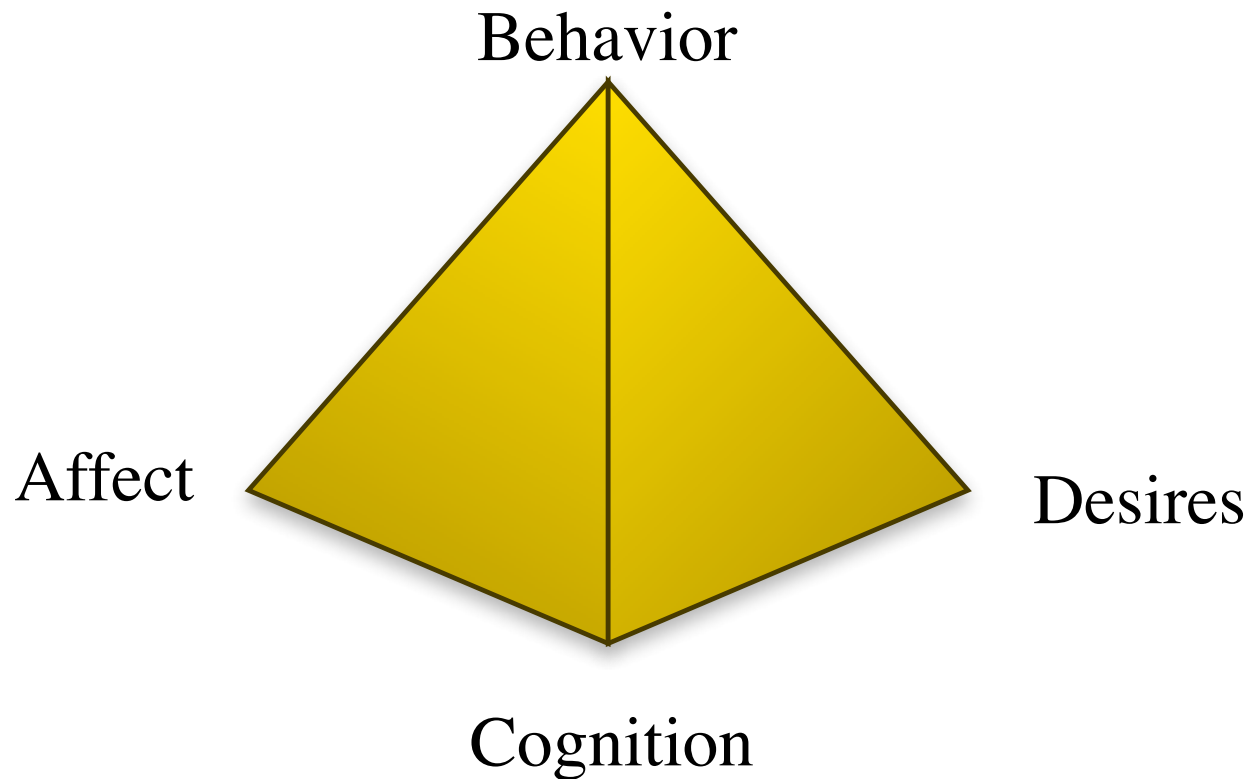
Personality is an abstraction used to explain consistency and coherency in an individual's pattern of Affects, Cognitions, Desires and Behaviors. What one feels, thinks, wants and does changes from moment to moment and from situation to situation but shows a patterning across situations and over time that may be used to recognize, describe and even to understand a person. The task of the personality researcher is to identify the consistencies and differences within and between individuals (what one feels, thinks, wants and does) and eventually to try to explain them in terms of set of testable hypotheses (why one feels, thinks, wants and does).

# The ABCDs of Personality

- Affect (what we feel)
- Behavior (what we do)
- Cognition (what we think)
- Desire (what we want)
- Environment (where we are)

Ortony, A., Norman, D.A. & Revelle, W. (2005): [Effective Functioning: A Three Level Model of Affect, Motivation, Cognition, and Behavior](#). in J. M. Fellous & M. A. Arbib (Eds.), *Who Needs Emotions? The Brain Meets the Machine*. New York: Oxford University Press.

# The ABCDs of Personality





# The ABCDs and the study of personality

- Four fundamental components
  - Affect, Cognition, Desire, Behavior
- Six pairwise “edges”
  - e.g., Affect x Cognition, Affect x Behavior, Cognition x Behavior, ...
- Four facets (Affect x Cognition x Behavior, ...)
- Complete Integration requires ABCD

# But, the ABCDs happen at three levels of processing

- Reflective
  - Control process monitors Reactive and Routine levels
- Routine
  - External Cues evoke Action Tendencies
  - Action Tendencies elicit Actions
  - Actions reduce action tendencies
- Reactive
  - External Cues evoke fixed action patterns

See MacLean (1990), Ortony et al., (2005) Sloman & Logan(2005)

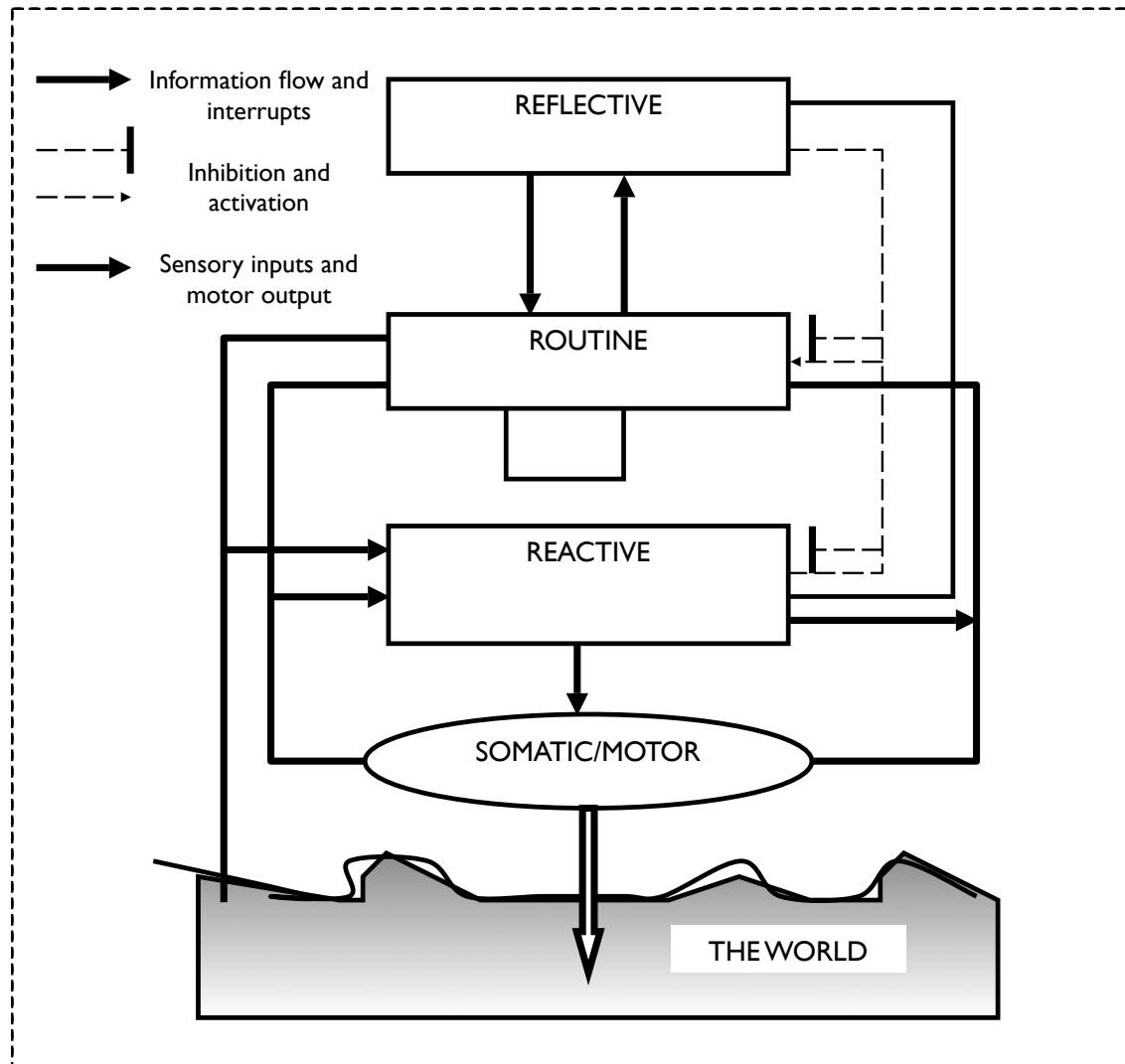
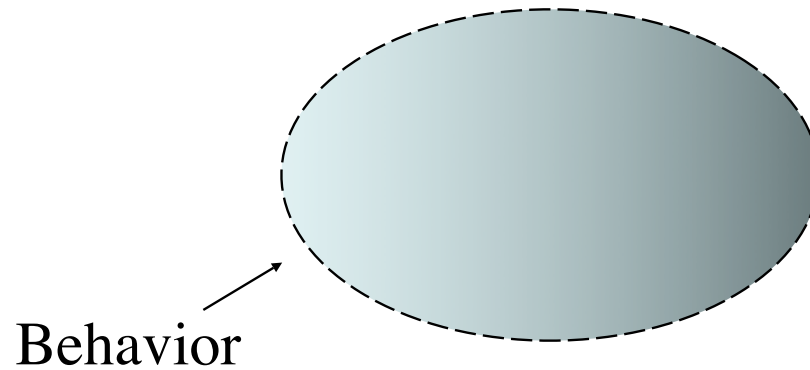


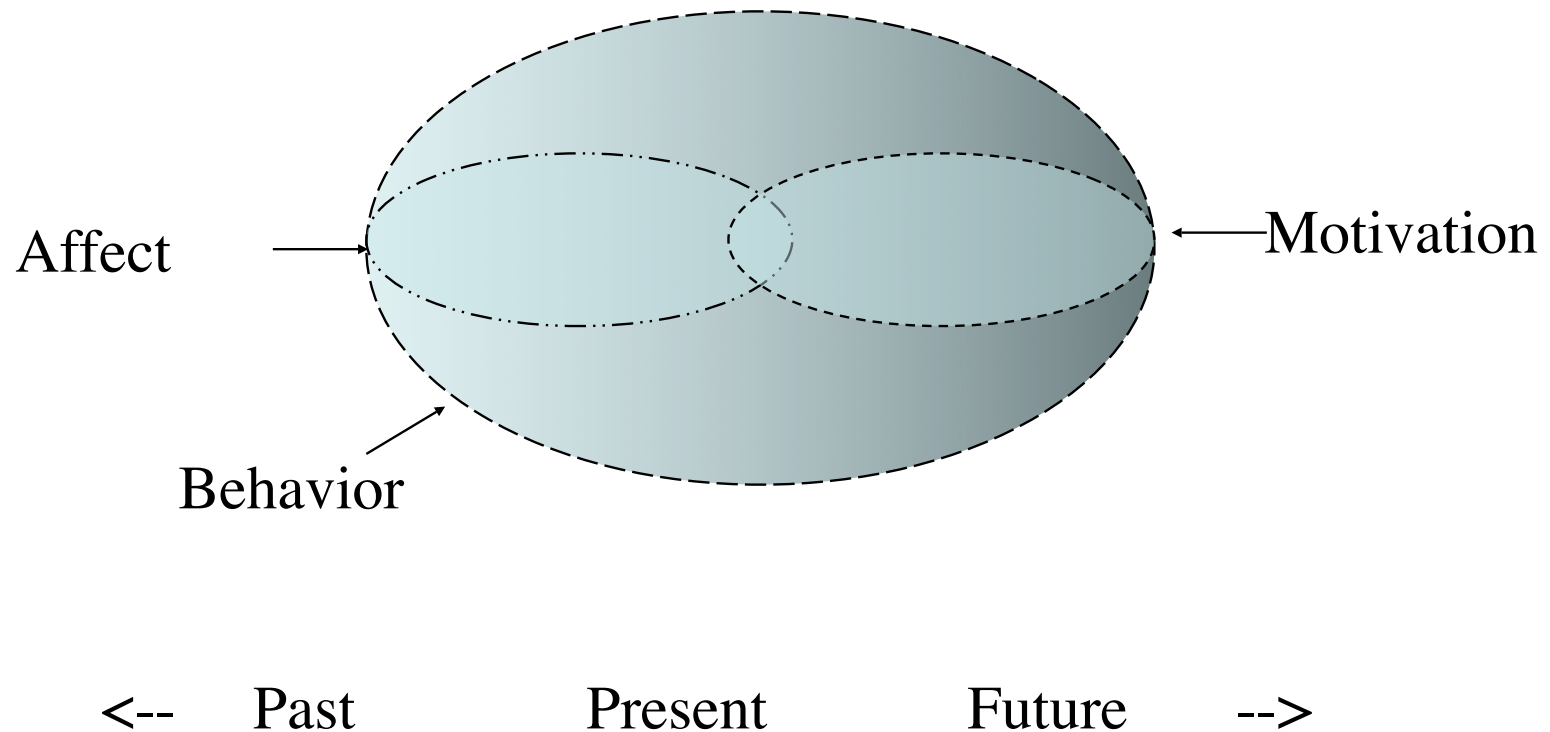
Figure 1. The three basic processing levels – Reactive, Routine, and Reflective, showing their interconnections and relationships both to one another, to somatic and motor states, and to the state of the world. Small solid lines indicate both information content and interrupt signals that serve to initiate activity. Broken lines indicate excitatory and inhibitory influences from the reflective level to those below. Thick solid lines indicate response initiation (downward flowing arrows) and sensory signals (upward arrows) from both internal (the somatic/motor systems) and external sensors (sensing the environment).

# Behavior at the Reactive Level

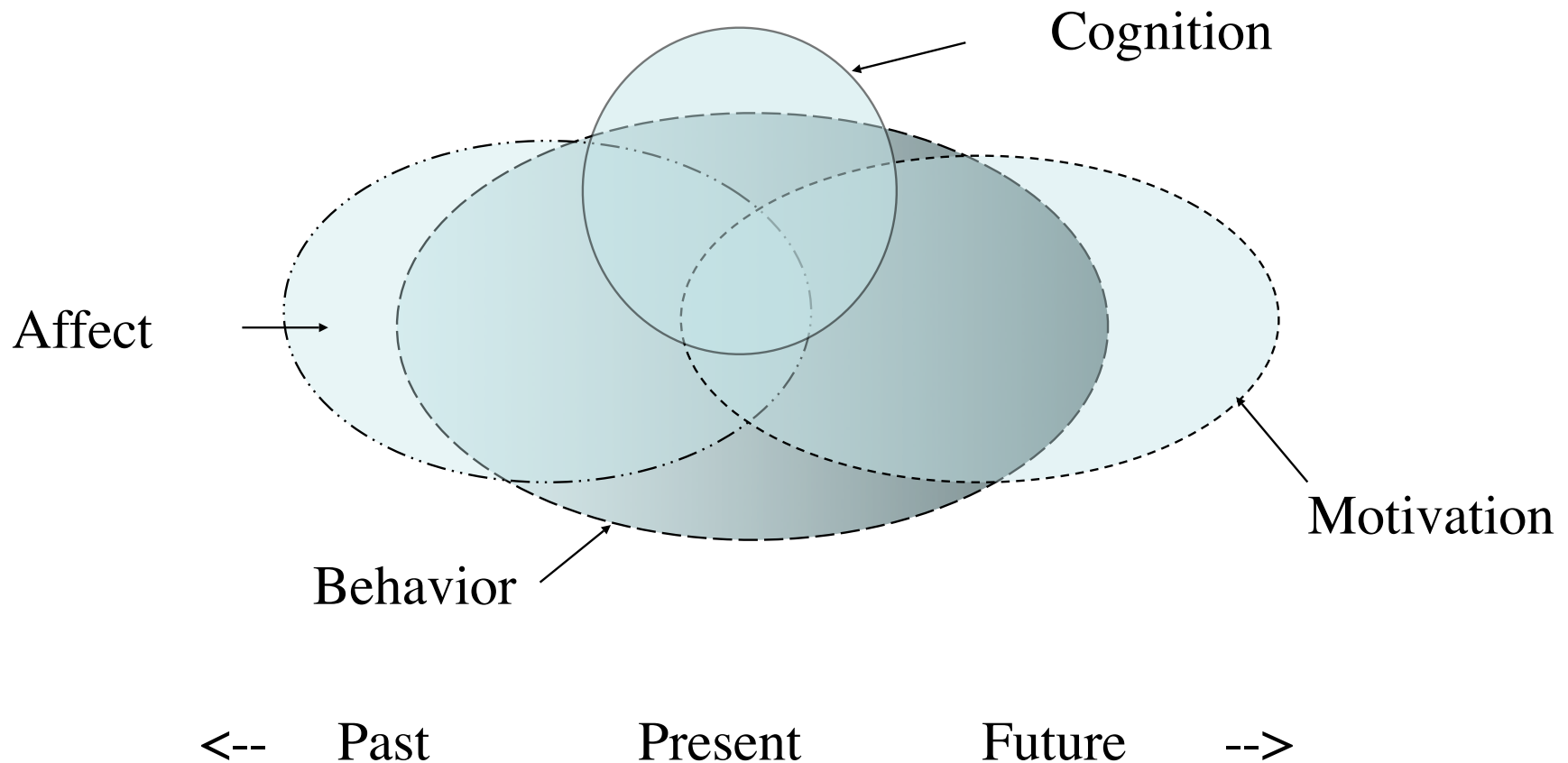


<-- Past Present Future -->

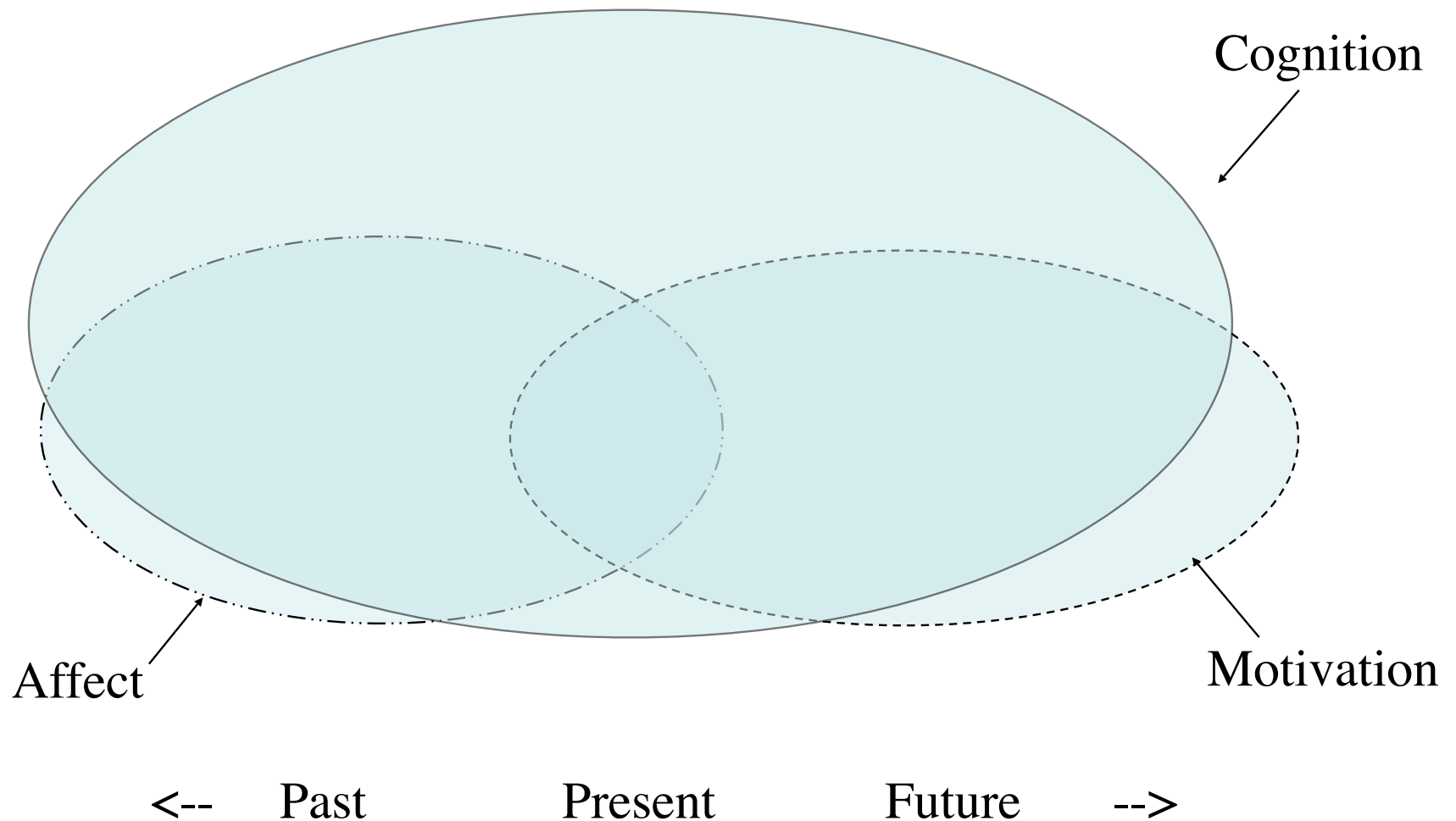
# Affect, Motivation and Behavior at the Reactive Level



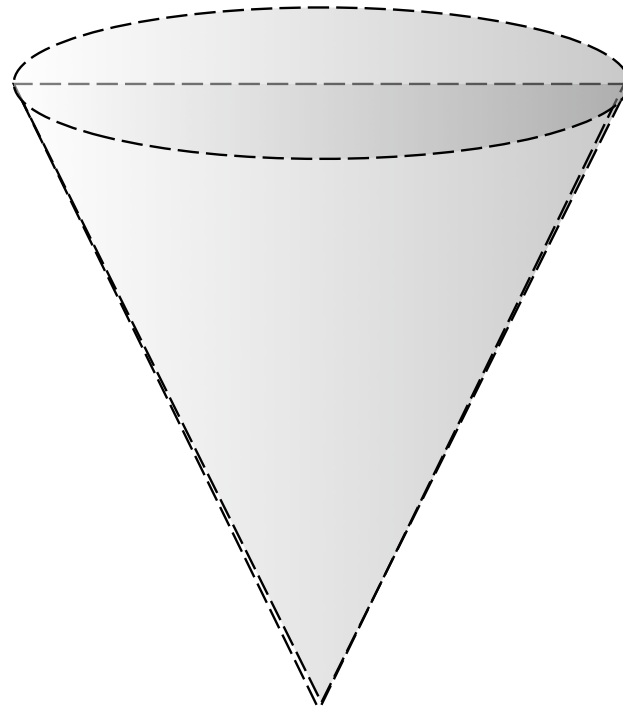
# Affect, Motivation, Cognition and Behavior at the Routine Level



# Affect, Motivation, and Cognition at the Reflective Level



# Behavior across levels of processing

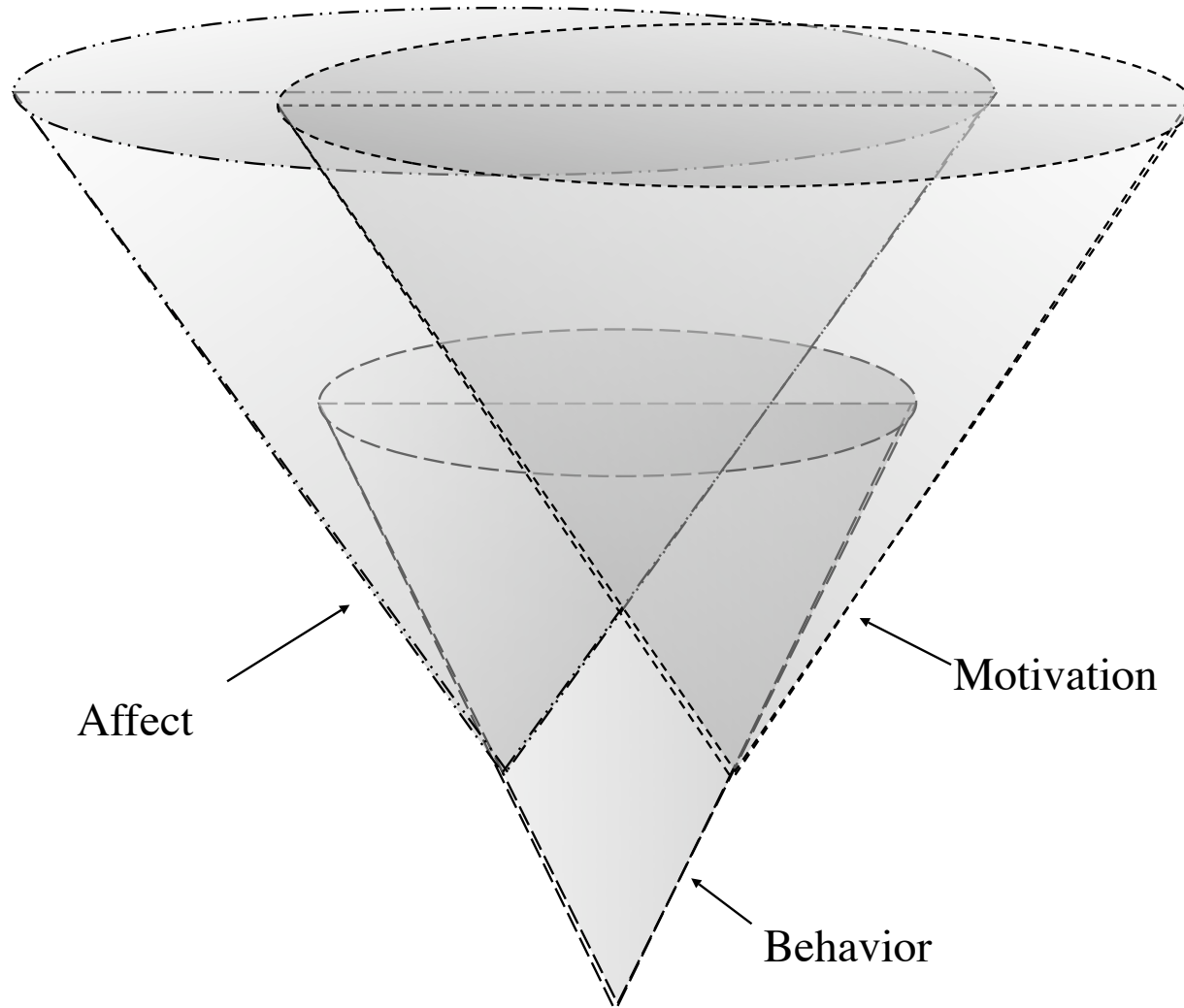


Immediate Past    Present    Immediate future

<----- Reactive    -- Routine    -- Reflective    ----->



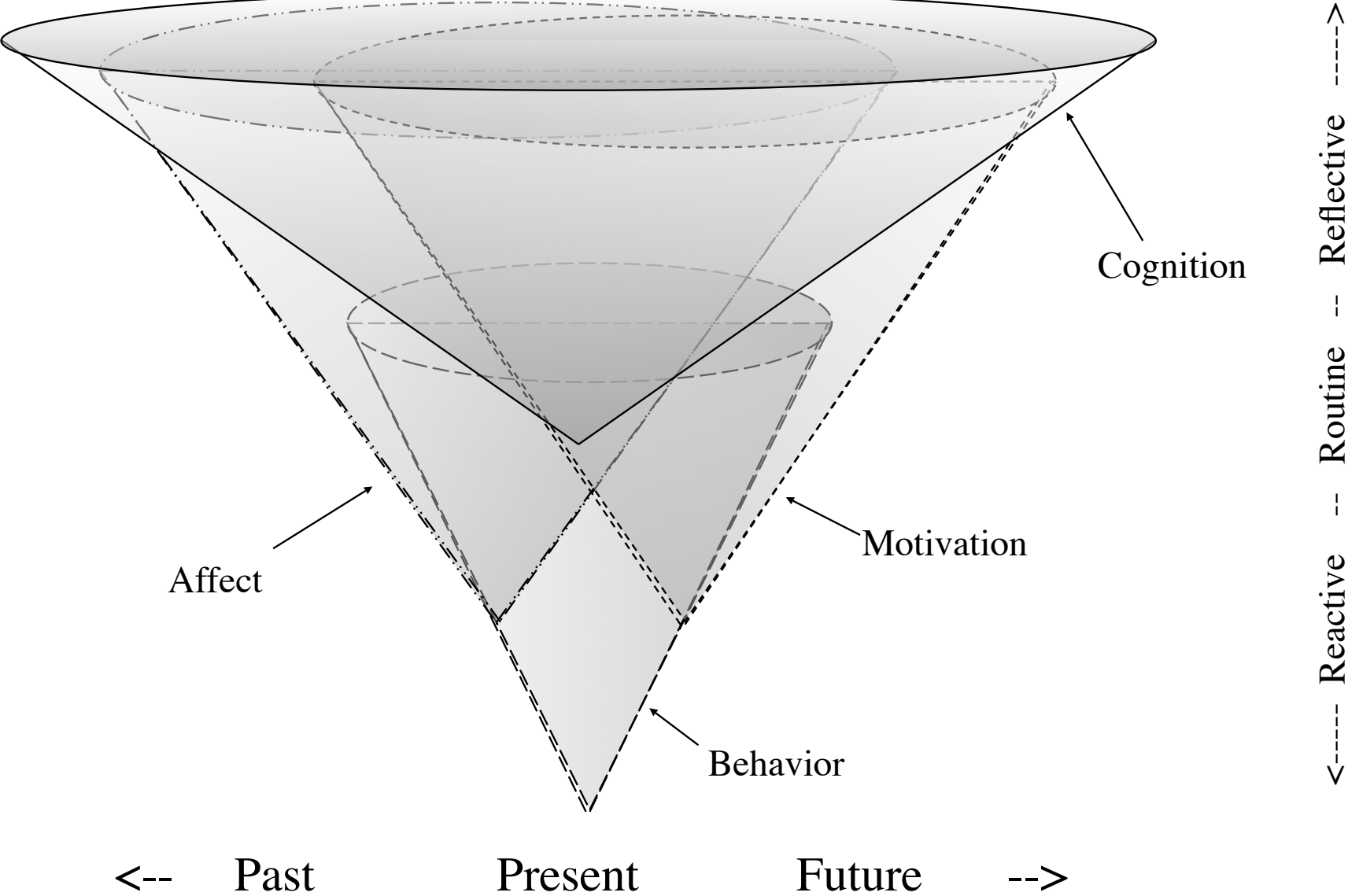
Affect, Motivation, and Behavior interact across levels of processing



<-- Past Present Future -->

<----- Reactive -- Routine -- Reflective ----->

# Affect, Motivation, Cognition and Behavior as interacting domains across levels of processing



# Three levels of four modes

- **Reflective** (controlled, conscious activity)
- **Routine** (learned automatic procedures)
- **Reactive** (fast pattern matching)

Ortony, A., Norman, D.A. & Revelle, W. (2005): [Effective Functioning: A Three Level Model of Affect, Motivation, Cognition, and Behavior](#). in J. M. Fellous & M. A. Arbib (Eds.), *Who Needs Emotions? The Brain Meets the Machine*. New York: Oxford University Press.

# ABCDs applied to Affect

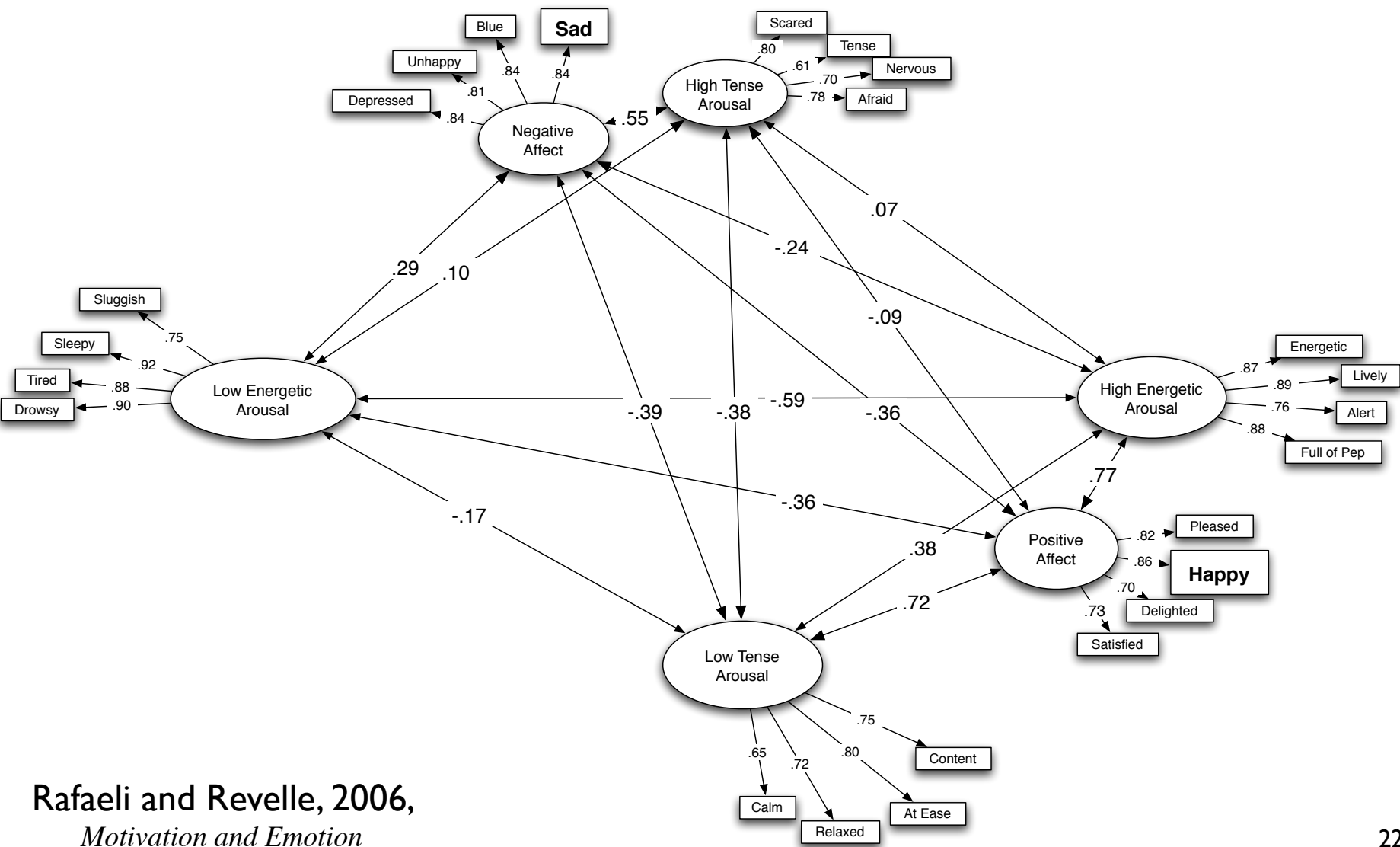
- Differentiated vs. Undifferentiated Affect
  - Affect manifest at different levels
    - Reactive: proto-affect
    - Routine: primitive emotions
    - Reflective: full blown emotions
  - Progressively more differentiation from Reactive through to Reflective level
    - maximum undifferentiated = diffuse
    - maximum differentiated = “full blown” emotions

(see Ortony, 2005, Affect and emotions in robots, Einstein Forum)

# Multiple formulations of the measurement of affect

- Categorical models of emotion (Eckman, Ortony)
- Dimensional Models
  - Two dimensional models
    - Affective Valence and Arousal as “Core Affect” (Russell, Feldman-Barrett)
    - Positive and Negative Affect (Tellegen, Watson & Clark)
    - Energetic and Tense Arousal (Thayer)
  - Multidimensional models
    - Pleasantness-unpleasantness, rest-activation, relaxation-attention (Wundt)
      - (Reisenzein, Schimmack)
    - Energetic Arousal, Tense Arousal, and Hedonic Tone (Matthews)
    - Hierarchical models (Watson and Tellegen)

# Structure of Affect and Arousal



Rafaeli and Revelle, 2006,  
*Motivation and Emotion*

# Personality, Affect and Categorization: 5 examples

- **Trait and State Affect bias -> Cognitive Bias:** Weiler, M. A (1992) Sensitivity to affectively valenced stimuli. Unpublished doctoral dissertation, Northwestern University, Evanston, IL.
- **Trait & State Affect -> Cognitive Bias:** Rogers, G. and Revelle, W. (1998) Personality, mood, and the evaluation of affective and neutral word pairs. *Journal of Personality and Social Psychology*, 74, 1592-1605
- **Cognitive Representation -> Behavioral Variability** Klirs, E. G. & Revelle, W. (1986) Predicting variability from perceived situational similarity. *Journal of Research in Personality*, 20, 34-50.
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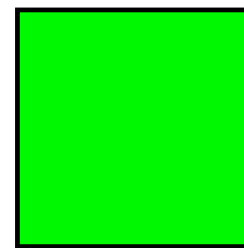
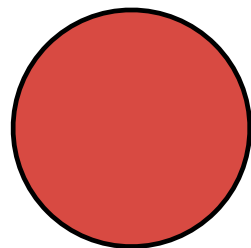
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3. Cognitive Representation -> Behavioral  
Variability
4. Trait Cognitive -> Cognitive Bias:
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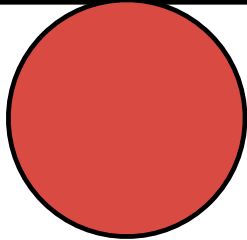
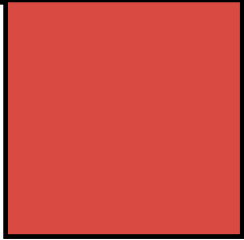
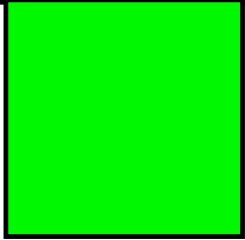


# Trait Affect versus Cognitive Semantics: Effects on Categorization (Weiler, 1992)

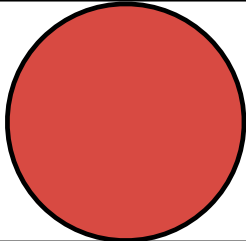
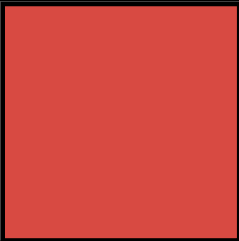
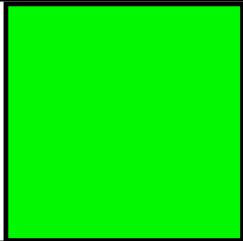
- Analogy of color blind vs. shape blind individual doing similarity judgement
- Which of these belong together, which is not the same? (The Sesame Street Game)



# Weiler task: Categorization by Affect versus Cognitive

		
Affect A	Affect B	Neutral B
Positive A	Positive B	Neutral B
Negative A	Negative B	Neutral B

# Weiler task: Categorization by Affect versus Semantics

		
Affect A	Affect B	Neutral B
Fall Down (- A)	Drown (- B)	Swim (B)
Hug (+ A)	Smile (+ B)	Face (B)

# Sample Triplets

Baseball	Bullet	Knife
Brutal	Useless	Strong
Car wreck	Final Exam	Football game
Comedy	Failure	Tragedy
Broiled Steak	Chocolate cake	Fried Liver
Candy	Acorn	Apple
Carnival	Parade	Procession
Cupcake	Lifesaver	RollAids

# Weiler model -- adapted from J.A. Gray

- Personality traits reflect differential sensitivities to positive and negative aspects of the environment
- Sensitivity to positive cues independent of sensitivity to negative cues
- Sensitivity to positive cues should increase categorization based upon positive affect
- Sensitivity to negative cues should increase categorization based upon negative affect

# Sensitivity to Pleasant

# Sensitivity to Unpleasant

<b>-0.56</b>	0.02	The beauty of sunsets is greatly over-rated.
<b>-0.55</b>	-0.06	I prefer to take my bath or shower as quickly as possible just to get it over with.
<b>-0.51</b>	0.09	The warmth of an open fireplace doesn't especially sooth or calm me.
<b>0.51</b>	0.11	When I pass by a bakery, I just love the smell of fresh baking breads or pastries.
<b>0.5</b>	-0.04	Beautiful scenery can touch something deep and strong inside me.
<b>0.47</b>	-0.22	I have been fascinated with the dancing of flames in a fire place.
<b>-0.45</b>	0.12	I don't find anything exhilarating about a thunderstorm.
<b>0.44</b>	0.05	Having my back massaged feels wonderful to me.
0.18	<b>0.52</b>	I am always adjusting the thermostat, or wishing I could.
0.15	<b>0.49</b>	It is very annoying to me when a radio isn't tuned quite right.
0.15	<b>0.49</b>	I find body odor extremely offensive.
0.15	<b>0.48</b>	I find it very disappointing when something doesn't taste as good as I thought it would.
-0.05	<b>-0.47</b>	Bad odors have seldom bothered me.
0.12	<b>0.46</b>	Even the smallest piece of gravel in my shoe just drives me crazy until I can get it out
-0.09	<b>0.44</b>	I have terrible feelings when I am not sure I will succeed.
0.31	<b>0.42</b>	It is important to me to get the water temperature just right when I take a bath or shower.

# Sensitivities to pleasantness/ unpleasantness and categorization

	Sense+	Sense-	Pairs +	Pairs -	Val+	Val -
<i>S+</i>	<i>0.85</i>					
<i>S-</i>	0.03	<i>0.78</i>				
<i>P+</i>	0.26	-0.15	--			
<i>P-</i>	0.13	0.24	-0.01	--		
<i>V+</i>	0.53	-0.09	0.45	-0.04	<i>0.90</i>	
<i>V-</i>	-0.01	-0.40	-0.08	-0.23	-0.24	<i>0.89</i>

alpha reliabilities on diagonal

# Effect of traits on classification

	Sens +	Sens -	Pairs +	Pairs -
Mood +	<b>0.35</b>	-0.13	0.19	0.20
Mood -	<b>-0.30</b>	0.13	-0.06	-0.20
Ext	<b>0.25</b>	-0.06	<b>0.29</b>	-0.09
Soc	<b>0.31</b>	-0.11	<b>0.23</b>	-0.10
Imp	0.13	0.02	<b>0.24</b>	0.02
Surg	<b>0.43</b>	0.02	0.17	-0.08
Agree	<b>0.29</b>	-0.06	0.09	-0.20
Intellect	0.35	0.07	-0.03	-0.01
Neurot	-0.17	<b>0.35</b>	-0.07	0.06
Stability	0.18	<b>-0.24</b>	-0.09	-0.10
Consc	0.15	<b>0.23</b>	-0.15	0.01
Psychot	<b>-0.35</b>	0.04	0.17	-0.02



# Personality, Affect and Categorization: 5 examples

1. Trait and State Affect bias -> Cognitive Bias
- 2. Trait & State Affect -> Cognitive Bias**
3. Cognitive Representation -> Behavioral Variability
4. Trait Cognitive -> Cognitive Bias:
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# Trait and State Affect -> Categorization

(Rogers & Revelle, 1998)

- Differential susceptibilities to positive and negative affective states have been proposed to underlie two major personality dimensions, Extraversion and Neuroticism, respectively. Concurrently, the influence of emotional states on cognitive processes has been heavily researched in clinical and social psychology. Four studies bridged these areas by investigating the relations between Extraversion, Neuroticism, and the evaluation of affectively pleasant, unpleasant, and neutral word pairs. Specifically measured were affectivity ratings, categorization according to affect, judgments of associative strength, and response latencies. A strong, consistent cognitive bias toward affective as opposed to neutral stimuli was found across participants. Although some biases were systematically related to personality and mood, effects of individual differences were present only under specific conditions. The results are discussed in terms of a personality/mood framework and its implications for cognitive functioning.

Rogers, G. and Revelle, W. (1998) Personality, mood, and the evaluation of affective and neutral word pairs. *Journal of Personality and Social Psychology*, 74, 1592-1605

# Trait and State Affect -> Categorization

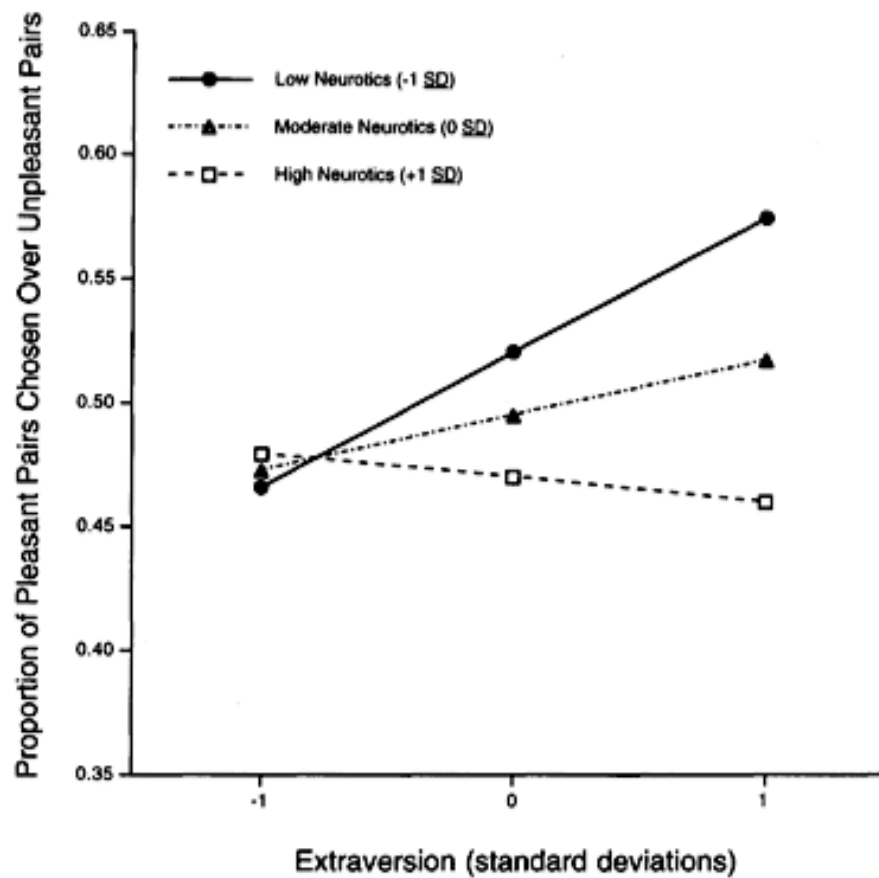
(Rogers & Revelle, 1998)

- Trait: Extraversion, Neuroticism
- Positive and Negative Affect induction (Movies)
- Categorization and associative strength
  - variation on the Weiler task
  - RT and choice between two pairs of words
    - which pair is more “similar”

# Which pair is more similar?

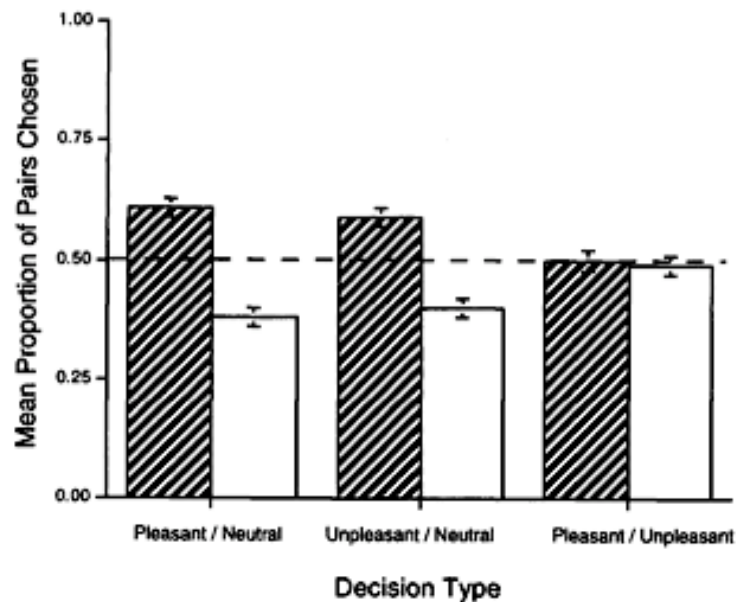
art	beauty		knife	kill
truth	honesty		grief	death
family	friends		devil	satan
dream	fantasy		sin	hell
stars	heaven		hate	despise
baby	cute		anger	rage
ocean	beach		starving	hunger
won	victory		larceny	thief
rose	smell		criminal	prison
dancing	fun		war	gun

# Pleasantness choice = $f(E \times N)$

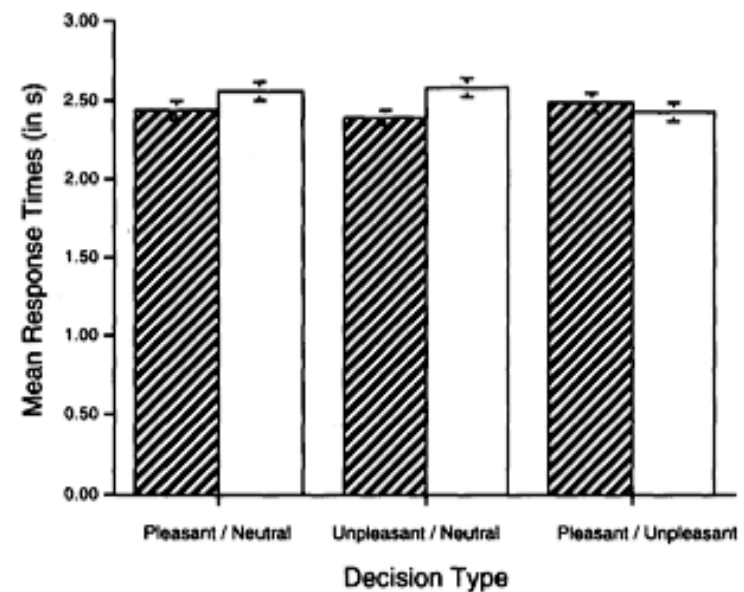


# Categorization of similarity: effect of valence on choice and RT

Choice



RT



# Personality, Affect and Categorization: 5 examples

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# Cognitive representation of environment: effect on behavior

- Individual differences in response to stressful environments reflects cognitive representations of environment. (See Kelly, 1955)
- Individual Differences in Multidimensional Scaling (INDSCAL) applied to commonly experienced environments.
- Examined how (reported) behavioral variability could be predicted from individual perceptions and categorizations of stressful situations

Klirs, E. G. & Revelle, W. (1986) Predicting variability from perceived situational similarity. *Journal of Research in Personality*, 20, 34-50.



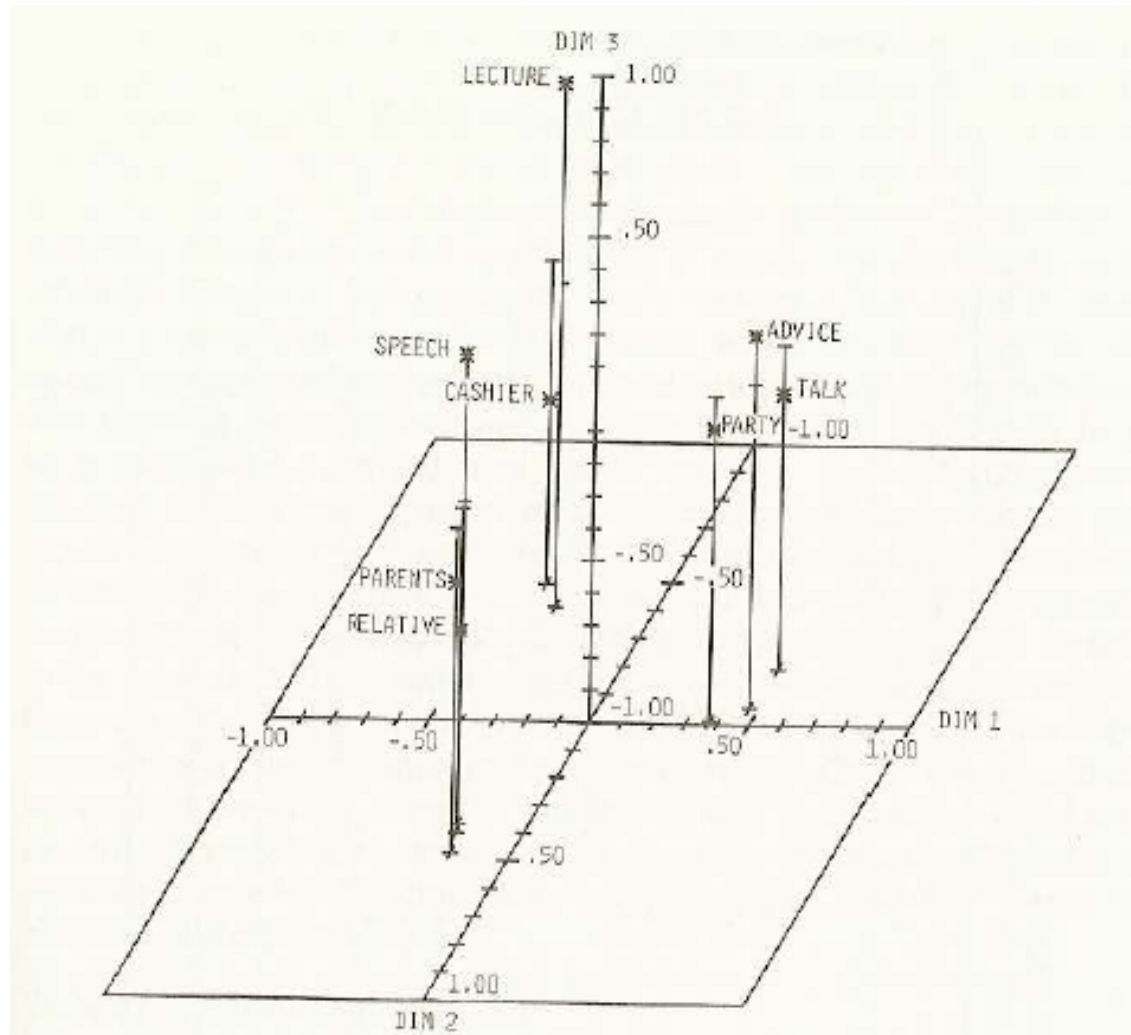
# Eight situations

(chosen from 28 situations to reflect variability)

- Giving a speech before a large group.
- Talking to a best friend.
- At a party with friends.
- Paying a cashier.
- Listening to a lecture.
- Meeting a girl/boyfriend's parents for the first time.
- Advising a friend.
- Meeting a distant relative for the first time.

# INDSCAL group space

Anxiety  
Involvement  
Intimacy



# Modeling cognitive representations predicts cross situational variability

- INDSCAL model allows for Nomothetic as well as Idiographic fit for individuals.
- Group space allows for nomothetic model
- Individual weight space \* Group space uses individual categorization of environment to predict individual variability across situations.

# Personality, Affect and Categorization: 5 examples

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# Personality and Breadth of Attention (Yovel, Revelle & Mineka, 2005)

- Shapiro's hypothesis of Obsessive vs. Hysteric Personality Disorders
- Global-Local task of Navon
- Obsessive-Compulsive and related traits (using SNAP and IPIP items)
- Examined Local Interference as a correlate of Obsessive-Compulsive

# Navon: Forest - Trees task

Consistent

Global and Local

```
  H           H           TTTTTT
  H           H           TTTT
  H           H           TTTT
  HHHHHHHH  H           TTTT
  H           H           TTTT
  H           H           TTTT
  H           H           TTTT
```

Inconsistent

Global and Local

```
  T           T           HHHHHH
  TTTT       T           H
  TTTT       T           H
  TTTT       T           H
  TTTT       T           H
  TTTT       T           H
  TTTT       T           H
```

Global - Neutral

```
  O           O           OOOOOO
  OO          OO           OO
  OO          OO           OO
  OO          OO           OO
  OO          OO           OO
  OO          OO           OO
  OO          OO           OO
```

Local - Neutral

```
  HHHHHHHH  TTTTTTTT
  H           H  TTTT
  H           H  TTTT
  H           H  TTTT
  H           H  TTTT
  H           H  TTTT
  H           H  TTTT
  HHHHHHHH  TTTTTTTT
```



# Personality correlates with RT measures

Trait	Global Precedence	Global Interference	Local Interference
HPD	0.06	0.04	0.19
OCPD	0.16	0.11	<b>0.33</b>
Entitlement	0.07	0.08	<b>0.32</b>
Exhibitionism	0.02	0.08	0.21
Impulsivity	0.00	0.06	0.13
Propriety	0.12	0.11	0.16
Workaholism	0.15	0.03	<b>0.27</b>



# Personality, Affect and Categorization: 5 examples

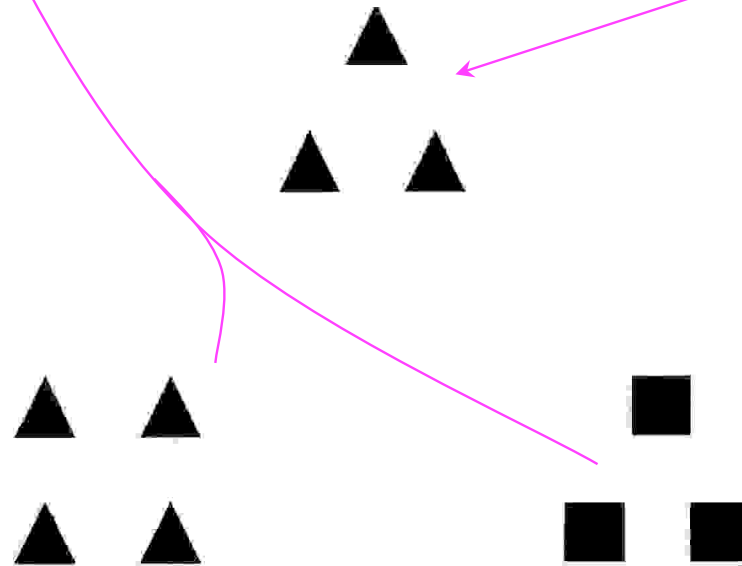
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# Affect and breadth of processing: Categorization (Gaspar and Clore, 2002)

- Positive Affect broadens, Negative Affect narrows the focus of attention
- Induction of Affect by Autobiographical Memories
- Categorization of objects by superordinate or subordinate characteristics

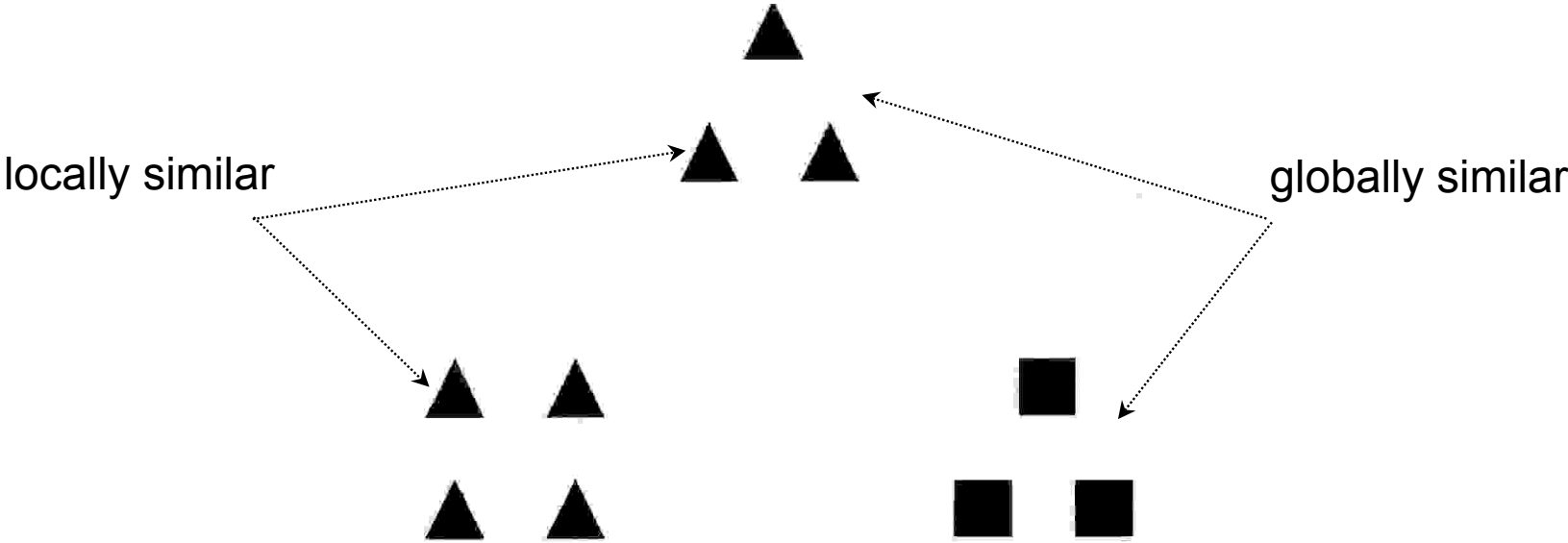
# Affect and Attention (Reactive)

- mood induction (autobiographical event)
- which comparison figure is more similar to target ?

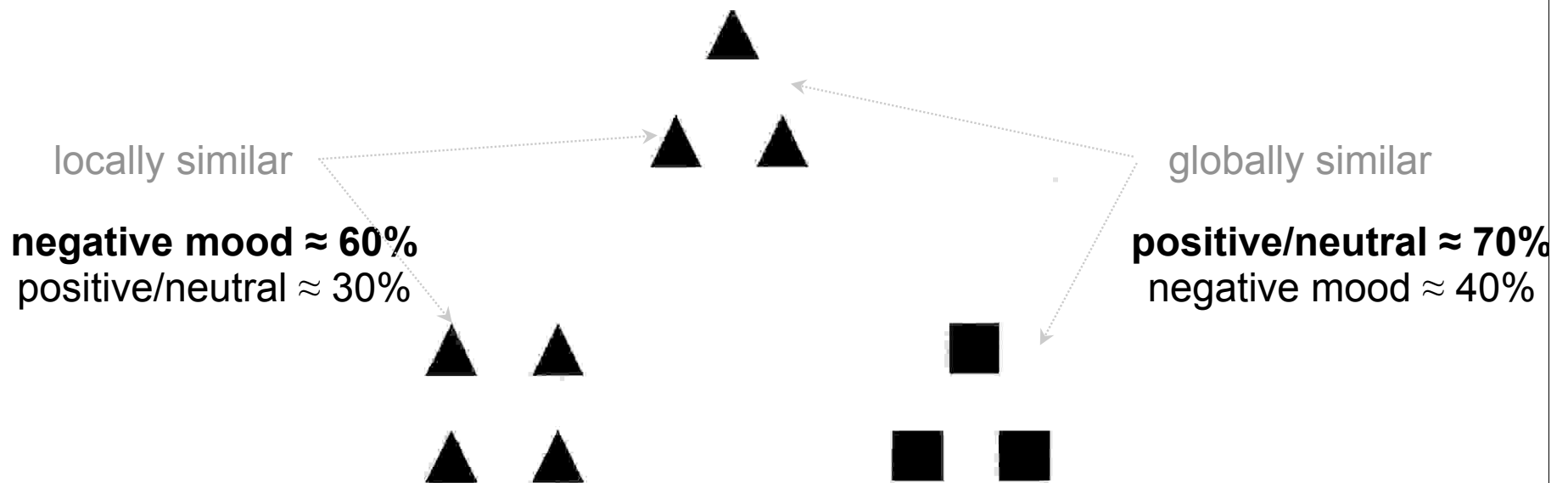


Gasper, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local processing of visual information, *Psychological Science*, 13, 34-40.

# Affect and Attention



# Affect and Attention (Reactive)



# ABCDs, Personality and Categorization

- Analysis of personality requires analysis in terms of fundamental components (ABCDs)
- Individual components, pairs of components (edges), triples of components (facets) and a complete integration helps us understand individual differences in categorization of rewarding, neutral, and punishing environmental cues.

# References

Gaspar, K., & Clore, G. L. (2002). Attending to the big picture: Mood and global versus local processing of visual information, *Psychological Science*, 13, 34-40.

Klirs, E. G. & Revelle, W. (1986) Predicting variability from perceived situational similarity. *Journal of Research in Personality*, 20, 34-50.

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Rafaeli, E. & Revelle, W. (2006). A premature consensus: Are happiness and sadness truly opposite affects? *Motivation and Emotion*.

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