

# What Can Unconscious Perception Tell Us About Consciousness?

Michael Snodgrass  
jmsnodgr@umich.edu

University of Michigan Medical Center

# Lessons from unconscious perception:

- 1) Issues involved in defining/operationalizing consciousness
- 2) Must go beyond purely experiential characterization:
  - How do conscious vs. unconscious processes differ?
  - “Conscious control” (i.e., volition) central concept
- 3) Leads to hierarchical tripartite model:
  - *Two* kinds of (un)consciousness (not one!)
    - phenomenal (first-order)
    - reflective (second-order; cf. Block’s “access”)
  - *Three* possible states
    - both *p*- and *r*- uncs.
    - p*-cs. but *r*-uncs.
    - both *p*- and *r*-cs.
- 4) Resolves various confusions, conflicts, etc.
  - Differing research areas studying different forms
  - Apply tripartite model and compare w/related ideas

# How should consciousness be defined?

## 1) Two basic approaches:

- Subjective threshold (ST)
  - change intensity; ask when aware/not
  - intuitively appealing; direct “self-report” (?!)
- Objective threshold (OT)
  - reduce intensity until discrimination = chance
  - more conservative, but “behavioral” (?!)

## 2) Subjective methods

- Long history--derived from classical psychophysics
- Striking property--direct discrimination  $>$  chance
  - blindsight in normals!
- If valid, implies uncs. facilitation on direct tasks
- *But*--maybe invalid--low-confidence, but weakly cs.

# How should consciousness be defined?

## 3) Signal Detection Theory (SDT; Green & Swets, 1967)

- Derived in 1950's--modern psychophysics
- Perceptual states *not discrete*
  - continuous, overlapping
- *All* discrimination responses *joint* product of:
  - actual discriminative ability ( $d'$ )
  - decision criterion ( $c$ )
  - $d'$  and  $c$  are independent
  - criterion placement under voluntary control
- Direct (unmediated) self-reports do not exist!
  - ST effects maybe just below-criterion
  - evidence from confidence ratings  
(cf. Haase, Theios, & Jenison, 1999)
- Doesn't prove ST effects cs., but plausibly are

# How should consciousness be defined?

## 4) Objective methods

- Go for  $d' = 0$ ; look for other (often indirect) effects
- But maybe kill uncs. effects altogether

## 5) So what to do? “Goldilocks dilemma”

- Key issue: Uncs. influences on direct tasks
- (Seems like) both methods can't be valid (?!)
- *But...*operationally, only varying stimulus strength  
--So...maybe OT just weaker ST  
(cf. Merikle, Smilek & Eastwood, 2001)
- *But...*this just means no real OT

# How do cs. and uncs. processes differ?

1) The cardinal qualitative difference: *Conscious control*

- If perception cs., can control; if uncs., cannot
- Need to distinguish *control* from *influence*

2) Can direct responses to ST stimuli be controlled?

- *Exclusion failure* (cf. Jacoby's, 1991 PDP)
- Merikle, Joordens, & Stolz (1995):
  - exclusion failure vs. success*
  - automatic vs. strategic priming*
  - false recognition (or not)*
- *But...maybe exclusion is decision process*
  - (Snodgrass, 2002; Banks, 2000; Haase & Fisk, 2001)
- If so, exclusion failure should vary with criterion
  - (cf. Visser & Merikle, 1999)
- So...responses to ST stimuli *can* be controlled

# How do cs. and uncs. processes differ?

## 3) Can responses to OT stimuli be controlled?

- What, if any, uncs. influences on direct tasks?  
(cf. dilemma--"exclusiveness problem")
- Seems like either a) none at all, or b) ST-like pattern
- Pop/look experiments (e.g., Snodgrass & Shevrin, in press, *Cognition*)
  - 4AFC ID task; detection  $d' = 0$
  - ID using *pop* & *look* task strategies
  - Also obtained task *preference*
- Results:
  - No overall facilitation (mean = 25.01)
  - But--bidirectional* effects (cf. Katz, 2001)
  - Preference X Strategy congruity effect
  - Includes *below-chance inhibition*
  - P X S effect *negatively* related to detection
  - Cannot control* responses to OT stimuli

# How do cs. and uncs. processes differ?

4) Recap & implications: Cs. control on direct tasks--ST vs. OT

- Subjective: unidirectional, under flexible control  
--behaves exactly like low-confidence cs.
- Objective: *only* bidirectional, uncontrollable  
--meets strong criteria for uncs. influence

5) ST & OT methods index *qualitatively different* processes

- ST: (below criterion)  $p$ -cs.; OT:  $p$ -uncs.
- Implies (unidirectional)  $d'$  indexes *only* cs. influences

6) Direct test: compare OT & ST effects with same Ss & conditions (research sponsored by MindScience)

- Dijksterhuis & Aarts (2003): ST conditions  
--Negative words detected > positive words
- Snodgrass et al. (submitted): OT conditions  
--Positive words detected > negative words
- Perceptual defense (OT) vs. vigilance (ST) pattern

# But are subjective threshold stimuli really just weakly conscious?

1) Powerfully nonintuitive to many--and with good reason

- Subjective threshold (i.e., the criterion) mediates *conscious control*
- Qualitative differences redux (Merikle et al. '95)
  - exclusion failure vs. success*
  - automatic vs. strategic priming*
  - false recognition (or not)*
- These qualitative differences reflect application (or not) of *metacognitive response strategies*

2) Subjective methods can differentiate:

- Phenomenal (first-order) consciousness
  - Experiential (e.g., perceptual) contents per se
- Reflective (second-order) consciousness
  - Reflects upon and evaluates *p*-cs. contents
- cf. Schooler (2002); Lambie & Marcel (2002)

# A hierarchical tripartite (maybe 3 1/2) model of consciousness

## 1) Three possible perceptual states:

- Completely unconscious: both *p*- and *r*- uncs.
- *P*-cs. but not *r*-cs.
- Both *p*- and *r*-cs.

## 2) Properties of the tripartite model:

- All *r*-cs. contents are also *p*-cs., but not reverse
- Because *r*-cs. highly capacity-limited system
- *But*--any *p*-cs. content can be selected into *r*-cs.
- So...no *p*-cs. contents are intrinsically *r*-uncs.
- *But*...*p*-uncs. contents *are* intrinsically *r*-uncs.

## 3) But is reflective consciousness really a legitimate form?

- *R*-cs. required for awareness of *influence*
  - e.g., bystander effect, cognitive dissonance
  - Jacoby's (1991) PDP--cs. control vs. automatic
  - implicit learning (cf. Dienes & Berry, 1997)

# A hierarchical tripartite (maybe 3 1/2) model of consciousness

4) What about *access* (cf. Block)? Is *r-cs.* a kind of *a-cs.*?

- Maybe...but:

  - perhaps *a-cs.* just focally attended *p-cs.*

  - important, required for working memory, global workspace, etc.

  - but need something else to actually perform reasoning, planning: *r-cs.*

- So...can be “*a-cs.*” but not *r-cs.*

- If so, access necessary but not sufficient for *r-cs.*

5) What about (top-down) attention and consciousness?

- Strong evidence attention not necessary for *p-cs.*

  - (cf. Lamme, Tsuchiya & Koch, ASSC10)

- Supported by Merikle & Joordens (1997)--ST and divided attention give same QDs

- Attention *is* necessary (and sufficient) for *a-cs.*; necessary but *not* sufficient for *r-cs.*

# A hierarchical tripartite (maybe 3 1/2) model of consciousness

## 6) General properties of the three levels of consciousness

- Reflective consciousness can (optionally):
  - do nothing
  - facilitate (more)
  - inhibit/reverse (cf. Libet's "veto" function)
- Phenomenal consciousness produces unidirectional facilitation effects (no genuine inhibition)
  - e.g., Bargh & colleagues' "oldster" studies
  - cf. James/ideomotor theory
  - see Dijksterhuis & Bargh (2001)
- Completely unconscious stimuli yield *uncontrollable* facilitation and/or inhibition w/direct tasks
  - also complex indirect effects: e.g. ERP:
  - Wong et al. (2004): trace conditioning
  - Bernat et al. (2001a,b); Bazan et al. (2006)
  - wide activity: frontal, parietal, temporal

# Further implications & comparisons

1) Dehaene et al. (2006):

- “Conscious”: *r*- (and *p*-) cs.
- “Preconscious”: *p*-cs but unattended
- “Subliminal”: conflates ST (*r*-uncs.) and OT (*p*-uncs.).

2) *Can* report what not *r*- (or *a*-) conscious of

- To index *p*-cs independently, calculate  $d'$
- $d'$  is a *subjective report*--just includes below-criterion
- Possible indicator of whether a given phenomenon implicates *p*- or *r*-uncs.  
--e.g., blindsight (cf. Azzopardi, ASSC10)
- Need right time, circumstances (Lamme, 2004)  
--don't confound *p*-cs with memory  
--especially relevant to attention paradigms:  
the killer B's (CB, IB, AB)

3) Compelling everyday examples--Dennett's chime & others

- *P*-cs when chime starts; *r*-cs when “notice”

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- For more see:
  - Snodgrass et al. (1994) a,b
  - Perception & Psychophysics*
  - Snodgrass & Shevrin (in press, *Cognition*)
  - Snodgrass (1992) *American Journal of Psychology*