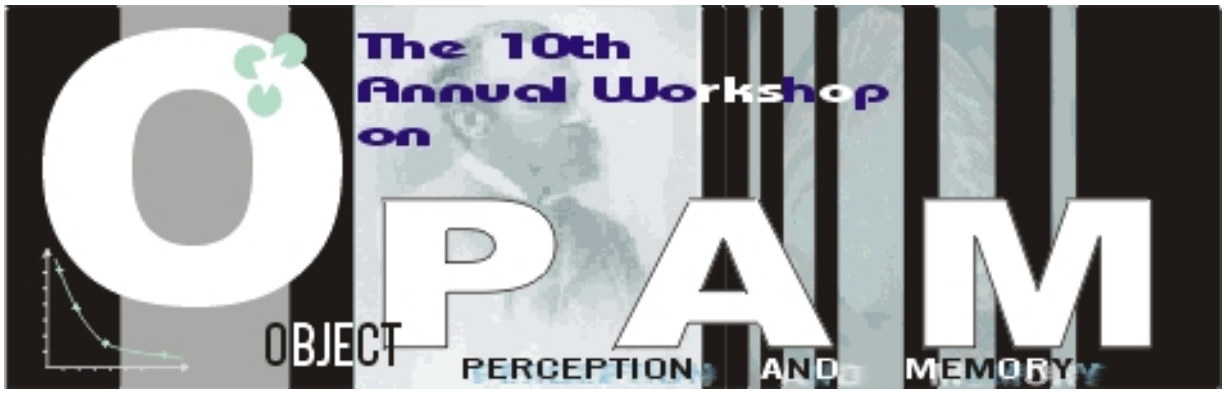

Kansas City, November 21, 2002

Abstract Book

Organizing committee:

Andrew Hollingworth, University of Iowa
Yuhong Jiang, MIT
Robert Rauschenberger, University of Arizona

Schedule

8:00	Registration
8:25	Opening remarks
Session 1: Visual search	
8:30	*On detecting two targets at once: The role of stimulus configuration* Palomares, Rampersad, & Egeth
8:50	*Does task difficulty modulate stimulus-driven attentional prioritization in visual search?* Proulx & Egeth
9:10	*Oculomotor consequences of onsets and offset* Boot, Kramer, & Peterson
Session 2: Representation of objects and faces	
9:40	*The effect of category learning on the representation of shape dimensions* Op de Beeck, Wagemans, & Vogel
10:00	*Matching face-like objects is invariant to differences in direction of contrast* Nederhouser, Mangini, Biederman, & Okada
10:20	*Effects of familiarity on the perception of facial identity and expression* Ganel & Goshen-Gottstein
Session 3: Object-based inhibition	
10:50	*Attentional mechanisms of visual marking: An event-related potential study* Belopolsky, Peterson, & Kramer
11:10	*Contextual cueing and visual marking: Are the marked items encoded?* Ono, Nabeta, & Kawahara
11:30	*Object-based inhibition as the basis for search over time* Grison, Paul, & Tipper
Lunch	
1:00	*Keynote address: Scene perception and memory* Mary C. Potter
Session 4: Attention	
1:50	*Effects of variations in response mappings on backward inhibition* Menzer & Dagenbach
2:10	*Attention on auto-pilot: Passive switching of attentional set* Leber & Egeth
2:30	*Attentional blink magnitude modulated by degree of object file continuity* Kellie & Shapiro
Session 5: General	
3:00	*Occlusion, illusion, and spatiotemporal fusion* Palmer & Kellman
3:20	*Teleporting works: Spatial updating experiments in Virtual Tübingen* Riecke, von der Heyde, & Bülthoff
3:40	*Three blinding devices: See how change detection runs* Mitroff, Simons, & Levin

Poster Session 4:00 – 5:30

Poster #	Poster title, author
1	*Task differences influence object-based attention* Ho & Atchley
2	*Object-based attention in pigeons?* Lazareva, Levin, Vecera, & Wasserman
3	*Gestalt perception of emotional expressions* Innes-Ker & Townsend
4	*Detecting configural and identity changes in upright and inverted faces* Keane, Burke, & Hayward
5	*Early maturity of face recognition in children* McKone & Gilchrist
6	*Distortions in face-space: Adaptation to relational changes* Robbins & McKone
7	*Moving the Thatcher illusion* Schwaninger, Cunnigham, & Kleiner
8	*When and why is the perception of human movement "special"?* Chouchourelou, Cohen & Shiffrar
9	*Acquisition of object and structural landmark knowledge in virtual environment navigation* Kalia & Stankiewicz
10	*The effect of motion on memory for 3D objects* Liu
11	*Perceiving and controlling simulated ego-rotations by optic flow: Influence of field of view (FOV) and display devices on ego-motion perception* Schulte-Pelkum, Riecke, von der Heyde, & Bülthoff
12	*The role of physical object properties in inferring actions and goals from the perception of visual events* Zibetti
13	*Numerical cues dominate simulated foraging in human adults* Barth
14	*A model of the dimensional consistency effect* Copeland & Wenger
15	*Parallel response-selection in the psychological refractory period paradigm* Watter

Abstracts

Talks

8:30-8:50

ON DETECTING TWO TARGETS AT ONCE: THE ROLE OF STIMULUS CONFIGURATION

Palomares, M., Rampersad, J., & Egeth, H.E.

Prior investigations of distance effects between two targets have yielded conflicting results. We found that distance effects depend on stimulus configuration and the presence or absence of distractors. We found no effect when targets appeared without distractors on a circular path. However, accuracy improved when targets are close together on the horizontal meridian. When distractors were added in both configurations accuracy decreased when targets are close together. Our results support the ideas that the attentional "spotlight": 1) is elliptical with a facilitatory region that extends radially from the fovea to the periphery; and 2) that distractors induce an inhibitory region around it.

8:50-9:10

DOES TASK DIFFICULTY MODULATE STIMULUS-DRIVEN ATTENTIONAL PRIORITIZATION IN VISUAL SEARCH?

Proulx, M., & Egeth, H.E.

Although models of visual search accommodate task difficulty with changes in the slope of search functions (e.g., Wolfe et al., 1992), the impact on stimulus-driven attentional prioritization is not clear. An increase in difficulty could either (a) increase the prioritization of a brightness singleton (cf., the effect of increasing display size on voluntary search strategies, Todd & Kramer, 1994), or (b) attenuate prioritization (cf., conjunctive versus feature search tasks, Lamy & Tsal, 1999). We found that increasing task difficulty diminished the attentional prioritization of a brightness singleton. The implications for accounts of attentional capture and visual search are discussed.

9:10-9:30

OCULOMOTOR CONSEQUENCES OF ONSETS AND OFFSETS

Boot, W.R., Kramer, A.F., & Peterson, M.S.

An important issue in attention is the extent to which bottom-up and top-down forces interact to control attention. Research has shown that the appearance of an object (onset) and the disappearance of an object (offset) have the ability to capture covert attention. To determine if onsets and offsets both have the ability to influence overt attention, a series of experiments were conducted in which participants had to make goal-directed eye movements to a color-singleton target in the presence of an irrelevant onset/offset distractor. Onsets demonstrated the ability to capture the eyes while offsets demonstrated little or no oculomotor capture. These findings are consistent with the "new object" theory of attentional capture in which onsets receive attentional priority over other types of changes in the visual environment.

Break

9:40-10:00

THE EFFECT OF CATEGORY LEARNING ON THE REPRESENTATION OF SHAPE DIMENSIONS

Op de Beeck, H., Wagemans, J., & Vogels, R.

Recent studies suggested that category learning has a profound influence on visual perception, resulting in independent processing of previously integral dimensions. We re-investigated this issue for shape dimensions. We first extended previous evidence that some shape dimensions ('aspect ratio' and 'curvature') are processed in a separable way, while other dimensions ('radial frequency components') are not. We then show that a relatively long phase of category learning improves the discrimination of a relevant compared to an irrelevant dimension, but only when these dimensions are separable. In conclusion, category learning does not result in independent processing of previously integral shape dimensions.

10:00-10:20

MATCHING FACE-LIKE OBJECTS IS INVARIANT TO DIFFERENCES IN DIRECTION OF CONTRAST

Nederhouser, M., Mangini, M. C., Biederman, I., & Okada, K.

Marked costs are incurred when matching faces that differ in contrast polarity but matching objects as similar as faces is invariant to contrast polarity. Subjects performed same-different and match-to-sample tasks with smooth, blobby asymmetric volumes which, unlike most objects, did not differ in their parts or nonaccidental properties but differed in the same features presumed necessary for individuating faces. Performance of a prosopagnosic was near chance with these stimuli. There was no effect of differences in contrast polarity for both naïve and expert subjects, with the latter trained for over 8,000 trials, to achieve expertise, on blobs with positive contrast.

10:20-10:40

EFFECTS OF FAMILIARITY ON THE PERCEPTION OF FACIAL IDENTITY AND EXPRESSION

Ganel, T., & Goshen-Gottstein, Y.

The effects of familiarity-of-faces on selective attention for identity and expression were tested. Selective attention was measured by subtracting performance between conditions in which the irrelevant dimension (identity or expression) was held constant from conditions in which the irrelevant dimension randomly varied. For unfamiliar faces, failure of selective attention was found from identity to expression but not from expression to identity. For familiar faces, the effect of identity on expression judgments was more than twice as large and was even found from expressions to identity. We suggest that expressions are computed in reference to the structure of the face.

Break

10:50-11:10

ATTENTIONAL MECHANISMS OF VISUAL MARKING: AN EVENT-RELATED POTENTIAL STUDY

Belopolsky, A.V., Peterson, M.S., & Kramer, A.F.

Visual marking is an attentional phenomenon that enables observers to selectively search through new information in the visual field. In a visual marking task search items are presented in two sets, separated by a time interval (gap interval), and with the second set (new items) containing the target. Event-related brain potentials (ERPs) were used to investigate whether visual marking operates via inhibition of the locations of the old items during the gap interval. ERPs time-locked to the probe indicated that active attention, rather than inhibition was applied to the locations of the old items during the gap interval.

11:10-11:30

CONTEXTUAL CUEING AND VISUAL MARKING: ARE THE MARKED ITEMS ENCODED?

Ono, F., Nabeta, T., & Kawahara, J.

We examined the attentional constraints of a contextual cueing effect that is known to occur only for attended items: whether the items that were attended to but inhibited afterwards yield the effect. We adopted a hybrid paradigm of visual marking and contextual cueing procedures. Half the distractors preceded the others and a target for 1 sec. The results showed a contextual cueing effect even with marked items. Follow-up experiments revealed that this was not due to efficient visual marking but the cueing effect. These results suggest that spatial configurations that were attended to but inhibited afterwards can be encoded as context.

11:30-11:50

OBJECT-BASED INHIBITION AS THE BASIS FOR SEARCH OVER TIME

Grison, S., Paul, M.A., & Tipper, S.P.

In orienting tasks, response is slower to a target in a previously cued versus uncued location. Because inhibition of return (IOR) also exists when cueing objects, we postulated that inhibition of stable object-based representations could mediate successful search over time. The outcomes of several experiments suggested that: 1. object-based IOR lasts longer than location-based IOR, 2. object-based IOR depends on inhibition of identity representations, and 3. long-term IOR exists over several minutes and dozens of trials when inhibition is applied to objects. The processes underlying IOR can facilitate search over time, but this depends on inhibition of object information.

Lunch

1:00-1:40

KEYNOTE ADDRESS: SCENE PERCEPTION AND MEMORY

Mary C. Potter

Break

1:50-2:10

EFFECTS OF VARIATIONS IN RESPONSE MAPPINGS ON BACKWARD INHIBITION

Menzer, D., & Dagenbach, D.

Mayr and Keele (2000) demonstrated that perceptual dimensions of recently abandoned task sets were inhibited relative to less recently abandoned task sets. They labeled this effect “backward inhibition” and suggested that the inhibition operated on abstract task set representations. The present study was designed to replicate backward inhibition with a novel stimulus display, and examine whether backward inhibition applies to motor response mappings as implied in their account. Results showed that backward inhibition was not observed unless repetitions of target perceptual dimensions were presented in conjunction with repetitions of target response mappings.

2:10-2:30

ATTENTION ON AUTO-PILOT: PASSIVE SWITCHING OF ATTENTIONAL SET

Leber, A.B., & Egeth, H.E.

In two recent experiments (Leber & Egeth, submitted), we observed that participants maintained pre-established attentional sets rather than reconfiguring to the most optimal set for each stimulus environment. Was this maintenance the result of passive processes (e.g., "contention scheduling;" see Norman & Shallice, 1986) or an active avoidance of reconfiguration? To test these alternatives, we required participants to unpredictably alternate between two distinct attentional sets for a 320 trial pre-test block. Afterwards, we presented conditions where switching was no longer required. Surprisingly, participants "perseverated" with their tendency to switch set. These results, and others, support the passive account.

2:30-2:50

ATTENTIONAL BLINK MAGNITUDE MODULATED BY DEGREE OF OBJECT FILE CONTINUITY

Kellie, F.J., & Shapiro, K.L.

The attentional blink (AB) is a deficit in correctly reporting a second target (T2) occurring 100-500 ms of the first (T1). Rapid serial visual presentation (RSVP) streams were manipulated such that targets could, to greater or lesser degrees, share the same object file. Targets were embedded within three stream types: a morph movie where one object smoothly changes into another; the same movie sequence presented randomly; or a random object stream. An inverse linear relationship was found between the degree of object file continuity inherent in the stream and AB magnitude. This was not due to differences in backward masking.

Break

3:00-3:20

OCCLUSION, ILLUSION, AND SPATIOTEMPORAL FUSION

Palmer, E., & Kellman, P.

Perception of moving, occluded objects is highly accurate when occluders contain many apertures, but is subject to a strong illusion when only two misaligned apertures are used. We tested perception of a vertically oriented rod moving behind an occluder with two horizontally offset apertures. The rod was perceived as misaligned in the direction of the apertures' offset, with illusion magnitude increasing linearly with velocity. We present a model that accounts for performance based on velocity underestimation after occlusion combined with an integration time of roughly 40 ms. The model agrees with findings from the flash-lag illusion and the anorthoscopic perception literature.

3:20-3:40

TELEPORTING WORKS – SPATIAL UPDATING EXPERIMENTS IN VIRTUAL TÜBINGEN

Riecke, B.E., von der Heyde, M., & Bülthoff, H.H.

Spatial updating was investigated using rapid pointing to previously-learned targets in high-end Virtual Reality. A photo-realistic virtual replica of the Tübingen marketplace and a motion platform were used for visual and vestibular simulation, respectively. Apart from the smooth spatial updating induced by continuous movement information, we unexpectedly also found discontinuous, jump-like "instantaneous spatial updating" that allowed participants to quickly adopt a new orientation without any explicit motion cues. These slide-show type presentations of new orientations were even sufficient in triggering obligatory, reflex-like spatial updating. This challenges the prevailing opinion that vestibular cues are required for automatic updating of ego-turns.

3:40-4:00

THREE BLINDING DEVICES: SEE HOW CHANGE DETECTION RUNS

Mitroff, S., Simons, D., & Levin, D.

Change blindness has been used to infer the nature of internal representations. If every change were detected, it could be inferred that detailed representations of the world are stored and accessible. However, as many changes are not detected, we must empirically determine how complete and accessible our visual representations are. We explored these issues by testing subjects' ability to detect changes to arrays of realistic objects. We find change blindness results from a failure to 1) form a representation of the pre-change and/or the post-change information, 2) maintain the pre-change representation, and 3) compare pre-change and post-change representations.

Posters

1

TASK DIFFERENCES INFLUENCE OBJECT-BASED ATTENTION

Ho, M.C.

Previous work showed that the task differences are associated with performance. The purpose is to examine whether the object-based costs changed with task difficulty. Two crossed dashed-lines with different colors were presented for five SOAs. A precue flashed at one of four ends. Next a target was displayed at one of four locations. Participants were required to respond to one of three target conditions depending on different tasks. The results showed that the object-based costs increased with increasing task difficulty at all SOAs. This study suggests that the task difficulty is crucial for object-based attention.

2

OBJECT-BASED ATTENTION IN PIGEONS?

Lazareva, O.F., Levin, J., Vecera, S.P., & Wasserman, E.

Can non-mammalian species use shape information to segregate a visual scene into candidate objects? We asked if pigeons could segregate two differently colored, superimposed shapes that had two dots on either the same or different objects. The dots were equidistant in the same and different trials. After the pigeons mastered the original segregation task, they received a series of transfer tests. The transfer data suggest that the original discrimination was not fully controlled by the exact location of the dots or by the object colors in their immediate vicinity, suggesting that pigeons can perform object segmentation using shape information.

3

GESTALT PERCEPTION OF EMOTIONAL EXPRESSIONS

Innes-Ker, A., & Townsend, J.T.

Gestalt perception of emotional expressions was investigated using a search paradigm. Using stochastic process models as a theoretical basis, evidence for parallel architecture, super-capacity, exhaustive stopping rule and positive dependence between channels can be considered as evidence for Gestalt processing. The features consisted of the eyes, nose and mouth extracted from photographs of emotional expressions. These were placed in either Gestalt or scrambled configurations. Features were either all from a single target or foil expression, or a mixture of both. Responses were made under either an “and” rule or an “or” rule. Results suggests an unlimited capacity independent parallel model.

4

DETECTING CONFIGURAL AND IDENTITY CHANGES IN UPRIGHT AND INVERTED FACES

Keane S., Burke, D., & Hayward, W.G.

Detection of categorical configural changes made to parts of novel objects is quicker and more accurate than detection of coordinate configural changes and both are easier and quicker to detect than changes to the identity of novel object parts (Keane, Hayward, & Burke, in press). The aim of this study was to investigate the detection of these kinds of changes to internal facial features. We used both upright and inverted faces to see whether the use of these different types of information is differentially disrupted. Results are discussed in context of the visual information used in processing objects and faces.

5

EARLY MATURITY OF FACE RECOGNITION IN CHILDREN

McKone, E., & Gilchrist, A.

It is still often claimed that face recognition in children matures late (e.g., 10 years), a result that would be incompatible with faces being innately “special.” Here, however, we argue that all adult style properties of face recognition are intact by 6-7 years at the latest, and perhaps much earlier. This conclusion is based partly on a literature review of adult-style tasks (inversion effects, composite effect, cross-race deficit, etc.) in children, and partly on a new experiment investigating local and relational contributions to distinctiveness effects on memory in 6-7 year olds.

6

DISTORTIONS IN FACE-SPACE: ADAPTATION TO RELATIONAL CHANGES

Robbins, R., & McKone, E.

We studied adaptation to distorted faces, using distortions designed to alter holistic information while leaving featural information intact. Under these circumstances we show a complete dissociation between the populations of neurons processing upright and inverted faces, by reporting no adaptation at all from an inverted adaptor to an upright test face. We also show that, within a face-space frame-work, a dimension associated with greater variation in the natural population of faces (height of both eyes together) shows greater adaptation than a dimension associated with less variation (asymmetry in eye height).

7

MOVING THE THATCHER ILLUSION

Schwaninger, A., Cunnigham, D., & Kleiner, M.

Inverting the eyes and mouth within a face produces a bizarre expression when the face is presented upright but not when it is inverted (Thatcher illusion, Thompson, 1980). Here, we investigated whether this illusion is part-based or holistic and whether motion affects perceived bizarreness. Static upright Thatcher faces were rated as more bizarre than the isolated parts, implying contextual processing. Interestingly, isolated parts were more bizarre than whole faces when inverted. Adding motion (smiling) increased bizarreness in all conditions. These results were replicated with talking faces, and are discussed within an integrative model of face processing.

8

WHEN AND WHY IS THE PERCEPTION OF HUMAN MOVEMENT "SPECIAL"?

Chouchourelou, A., Cohen, L., & Shiffrar, M.

Perceptions of human motion and object motion can differ. But, does the visual analysis of human motion differ from all other animal motions? Animal and human displacements were shown in apparent motion. In three conditions, observers viewed two-frame displays of locomoting animals, animal-like human motions, and common human motions. In a between-subjects design, qualitative assessments of apparent motion smoothness at ten ISIs were made. The results suggest differences in the perception of human and animal motion as a function of movement typicality and limb type. Findings are discussed relative to theories that human motion perception depends upon motor system input.

9

ACQUISITION OF OBJECT AND STRUCTURAL LANDMARK KNOWLEDGE IN VIRTUAL ENVIRONMENT NAVIGATION

Kalia, A.A., & Stankiewicz, B.J.

This study compared how structural and object landmark knowledge is learned during navigation and retained after a 24-hour, 7-day and 30-day delay. Subjects were trained and tested in a virtual reality indoor environment containing seven target locations. While navigating to a target location, subjects were queried about the objects and the structure of the building. We found that subjects were significantly more accurate in remembering the structural landmarks over the object landmarks, yet the rate of knowledge acquisition was the same. These data suggest that human navigation may rely on visual information generated by the structure of an environment more than visual information generated by objects in an environment.

10

THE EFFECT OF MOTION ON MEMORY FOR 3D OBJECTS

Liu, T.

We show that motion can affect the recognition of novel, 3-dimensional objects. In two experiments, subjects first studied a series of objects and then made an 'old/new' recognition judgment. The object's motion pattern was manipulated between the encoding and retrieval phases. We found that encoding object shape was facilitated by a translational motion but was impaired by a looming/zooming motion. However, translational motion during retrieval impaired memory, while looming/zooming motion had no reliable effect during retrieval. These results revealed a complex pattern of motion-shape interactions in object memory, and pose challenges for theories of object recognition and representation.

11

PERCEIVING AND CONTROLLING SIMULATED EGO-ROTATIONS BY OPTIC FLOW: INFLUENCE OF FIELD OF VIEW (FOV) AND DISPLAY DEVICES ON EGO-MOTION PERCEPTION

Schulte-Pelkum, J., Riecke, B.E., von der Heyde, M., & Bülthoff, H.H.

This study investigated humans' ability to control simulated ego-rotations from optic flow. The stimuli consisted of limited lifetime dots on a dark background. In a within-subject design, performance was tested using a curved projection screen (FOV 86°×63°), a HMD (40°×30°), and blinders (40°×30°) that restricted the FOV on the screen. Participants typically undershot intended turn angles. Performance was best with the screen (gain factor 0.77) and worst with the HMD (gain 0.57). A significant difference between blinders (gain 0.73) and HMD indicates that different display devices can influence ego-motion perception differentially, even if the physical FOVs are equal.

12

THE ROLE OF PHYSICAL OBJECT PROPERTIES IN INFERRING ACTIONS AND GOALS FROM THE PERCEPTION OF VISUAL EVENTS

Zibetti, E.

We report two experiments that were carried out to study the role of physical object properties in the understanding of visually perceived events as directed goal action. In the first experiment, results show that Heider & Simmel's (1944) animation can be segmented into nesting sequences, showing a goal and sub-goal structure. In the second experiment, results show that (i) the same movement elicits different verbal interpretations when the figures' physical properties vary and (ii) action verbs express more goal-directed actions as the length of proposed sequences increases (the temporal context). These results are consistent with the idea that physical properties of objects in combination with actions are fundamental for inferring actions and attributing goals in order to build a coherent understanding of an evolving visually perceived situation.

13

NUMERICAL CUES DOMINATE SIMULATED FORAGING IN HUMAN ADULTS

Barth, H.

Human adults, human infants, and nonhuman animals make judgments based on numerosity, even when continuous quantities are controlled. The biological relevance of numerical processing, however, remains uncertain. To explore the role of number in foraging decisions, human adults were presented with a simulated foraging situation. Subjects chose between two groups of red dots representing food. With no explicit instruction, subjects overwhelmingly used number rather than summed area as a cue to foraging decisions, even when the use of number led them to choose the smaller amount. These results suggest that number may play a central role in guiding foraging behavior.

14

A MODEL OF THE DIMENSIONAL CONSISTENCY EFFECT

Copeland, A.M., & Wenger, M.J.

Hierarchical forms with consistent dimensions are identified faster than those with inconsistent dimensions. We have obtained evidence suggesting that decisional bias is involved in the production of this dimensional consistency effect. To account for this decisional bias, we present a model of multidimensional visual form processing. Motivation comes from the role of cross-correlations in the visual cortex supporting visual identification. The model is capable of reproducing dimensional consistency effects, and effects associated with shifts in decisional bias. We also show how a learning mechanism can allow for predictions regarding the acquisition of the internal representations that support identification and shifts in decisional bias.

15

PARALLEL RESPONSE-SELECTION IN THE PSYCHOLOGICAL REFRACTORY PERIOD PARADIGM

Watter, S.

Recent evidence for parallel response-selection (RS) in dual-task situations demonstrates priming of Task1 response (R1) from Task2 response (R2) information, using different tasks in a strict Task1-then-Task2 paradigm, implying Task2 RS began before Task1 RS was complete. Such effects were observed in a dual-task where locus-of-slack analyses indicated serial RS processing, suggesting that overt serial behavior does not imply seriality of underlying RS processes. Analyses of single subject data revealed two distinct populations, allowing objective exclusion of subjects demonstrating R1 delaying/response-grouping behavior, guarding against the false production of priming effects.