Unattended feature interference during a dynamic sequence task

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Introduction

Discrimination of **features within temporal sequences** affected by:

- Rate of change of event (temporal frequency)
- Presence of distracters
- Salience of target features
  - Persistent features (color, orientation, etc.) easily discriminable

Patterns of temporal transients are highly salient cues that promote perceptual organization (Lee and Blake, 1999; Guttman et al., 2007).

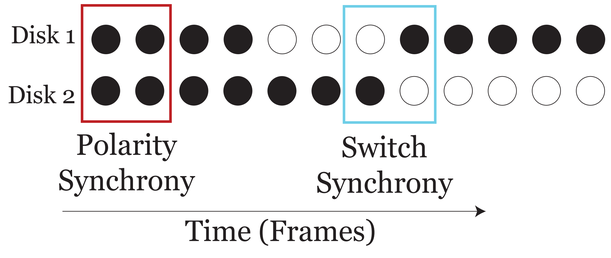
- Temporal salience of transients can affect attention to abruptly changing features (von Mühlenen et al., 2005), or spatially group random dot patterns into unique objects (Lee and Blake, 1999; Hancock et al., 2008; Cheadle et al., 2010).

We explore whether subjects can extract polarity and transient timing features from temporal patterns, and the vulnerability of these cues to distractions.

Methods

-**N=69** (ages 18-45, 27 male)

- Subjects viewed a pair of disks (4 deg eccentric)
  - Flicker for 1000-1200 ms, sandwiched in time between 350ms of textured disks
  - Temporal frequency: 2.5-15 Hz
    -Same frequency on individual trials
  - -**Aperiodic flicker cycle**: separately control polarity and transient timing of discs



Conditions: Attend to

1. **Polarity** (color) **synchrony** or
2. **Switch** (transient timing) **synchrony**

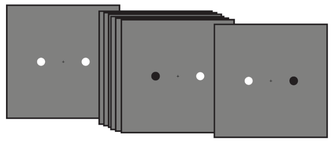
Task:

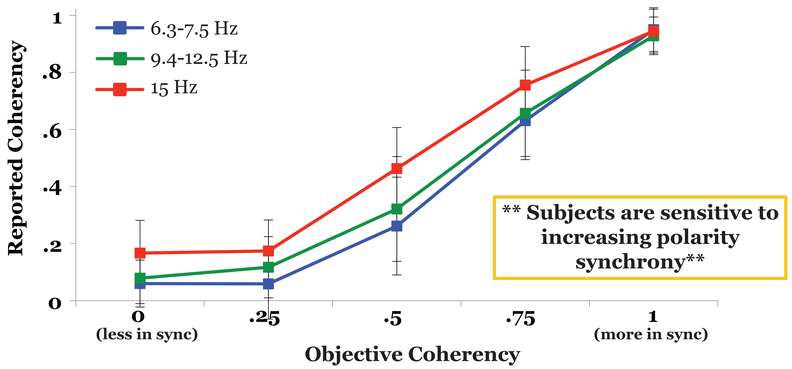
Subject compare synchrony of aperiodic discs based on condition

- Coherency of discs varied from 0-100%
  - -0% =least synchronous
  - -100%= most synchronous

Polarity Synchrony

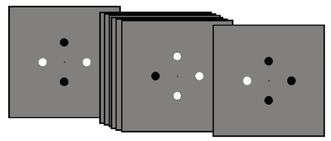
no spatial distracters

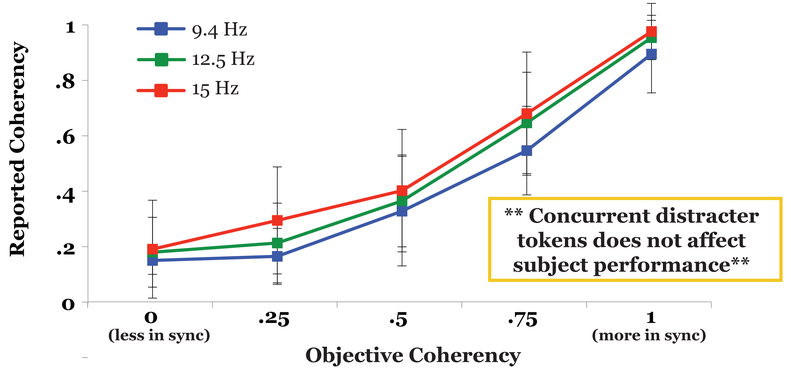




** Subjects are sensitive to increasing polarity synchrony**

with spatial distracters

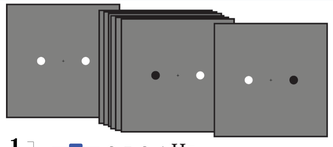


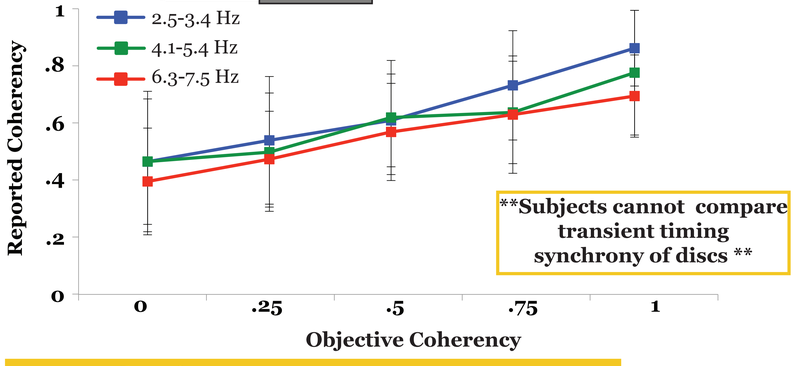


** Concurrent distracter tokens does not affect subject performance**

Switch Synchrony

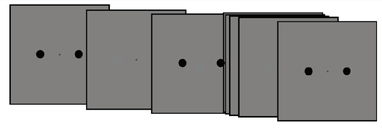
with polarity cues

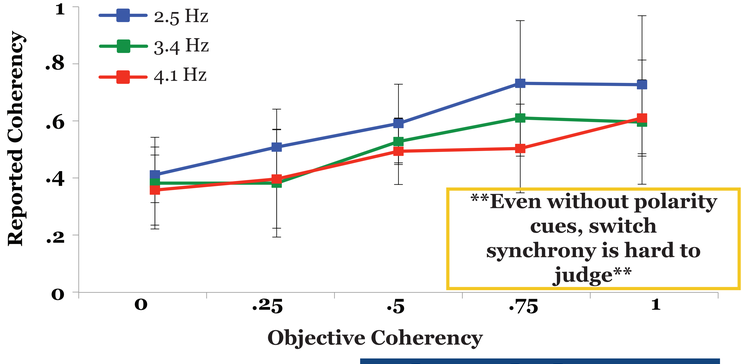




**Subjects cannot compare transient timing synchrony of discs **

no polarity cues





Even without polarity cues, switch synchrony is hard to judge

Conclusions

Even though transient timing information is important for temporally segregating perceptual information into unique events, feature-based attention mechanisms cannot selectively identify and analyze these signals in isolation.

Combined, features such as polarity, transient timing, color, and motion (to name a few) are all necessary to temporally segregate complex visual scenes. However, accessing certain features individually is not easily supported by feature-based attention mechanisms.

Acknowledgments

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