

THE ROLE OF WORKING MEMORY IN INFANTS' EXPECTATIONS

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1. INTRODUCTION

Recent research has demonstrated that very young infants are capable of forming expectations for predictable visual events (Haith, Hazan, & Goodman, 1988; Wentworth & Haith, 1992).

Adler and Haith (2003) have further shown that infants are capable of forming expectations for the predictable color content within changing picture events.

A number of theories have suggested that such expectations are formed as a function of memory (Grossberg, 1995; Rovee-Collier & Hayne, 1987).

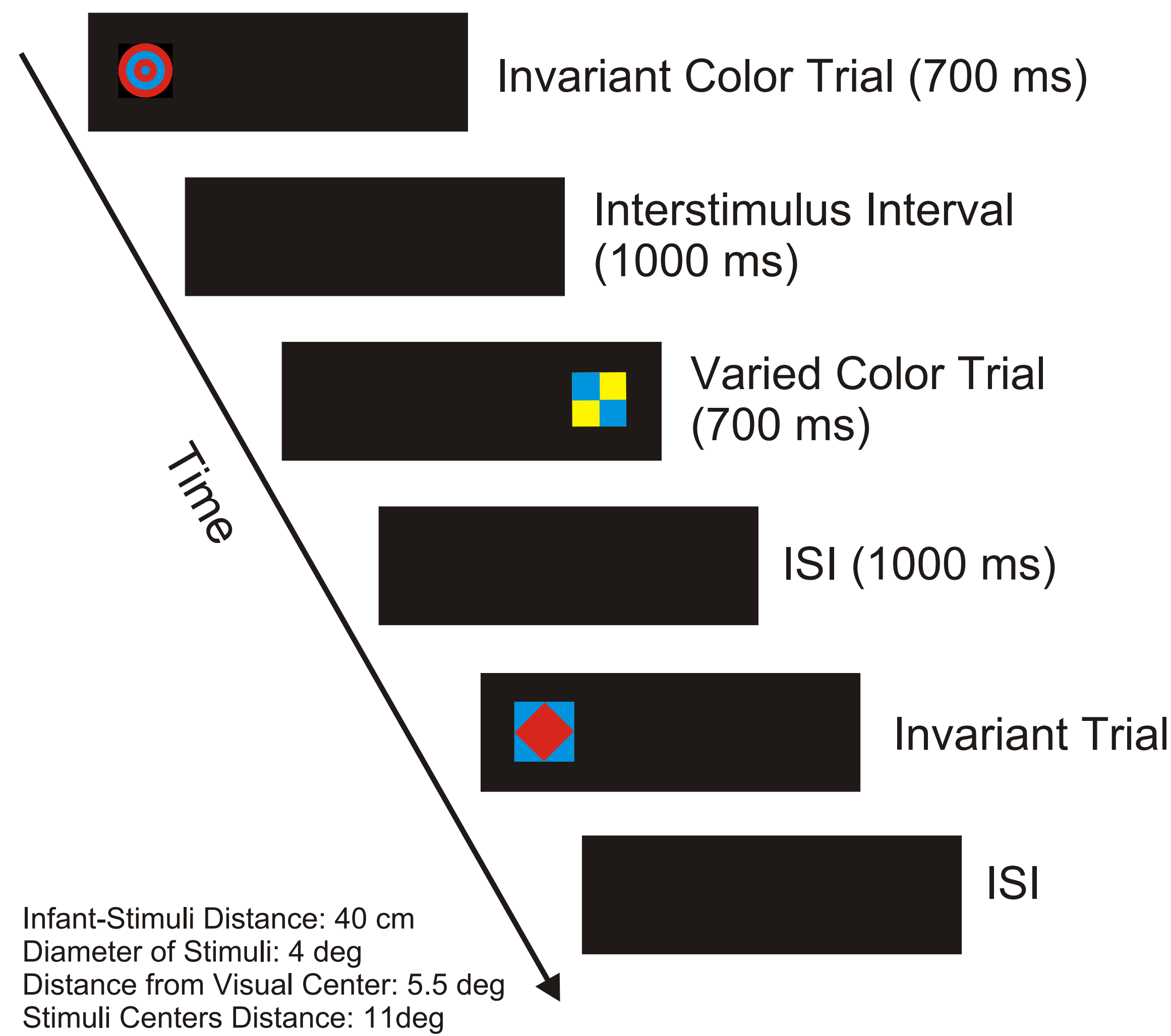
Working memory is particularly relevant because information about the previous event needs to be temporarily retained in order to predict the next event.

If expectation formation and working memory are related, then expectation formation should be sensitive to the same limitations as working memory.

In the present study, therefore, we investigated the influence of temporal decay and interference on infants' expectation formation for predictable color content.

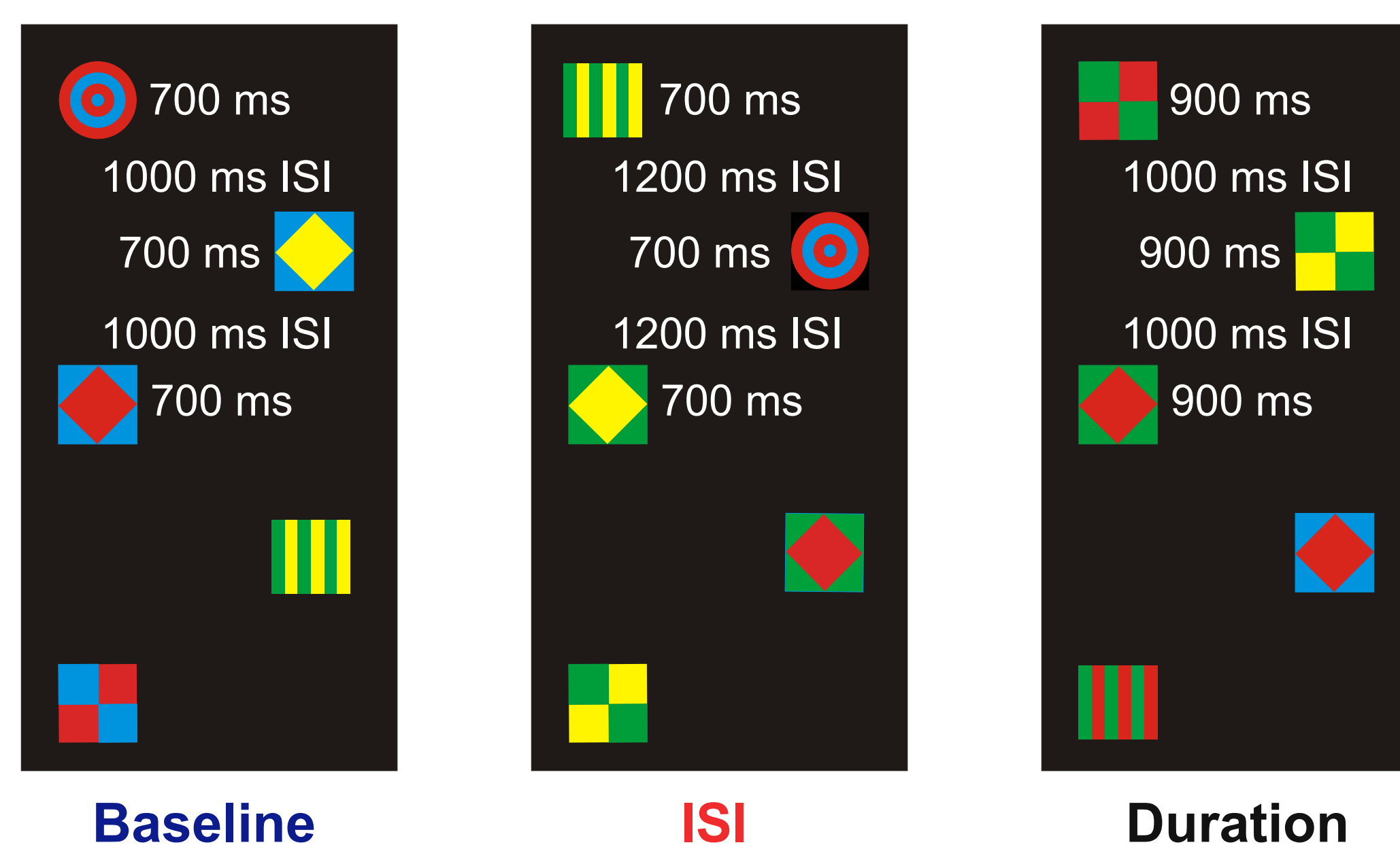
2. GENERAL METHODS

Sample Trial Sequence in Baseline Group



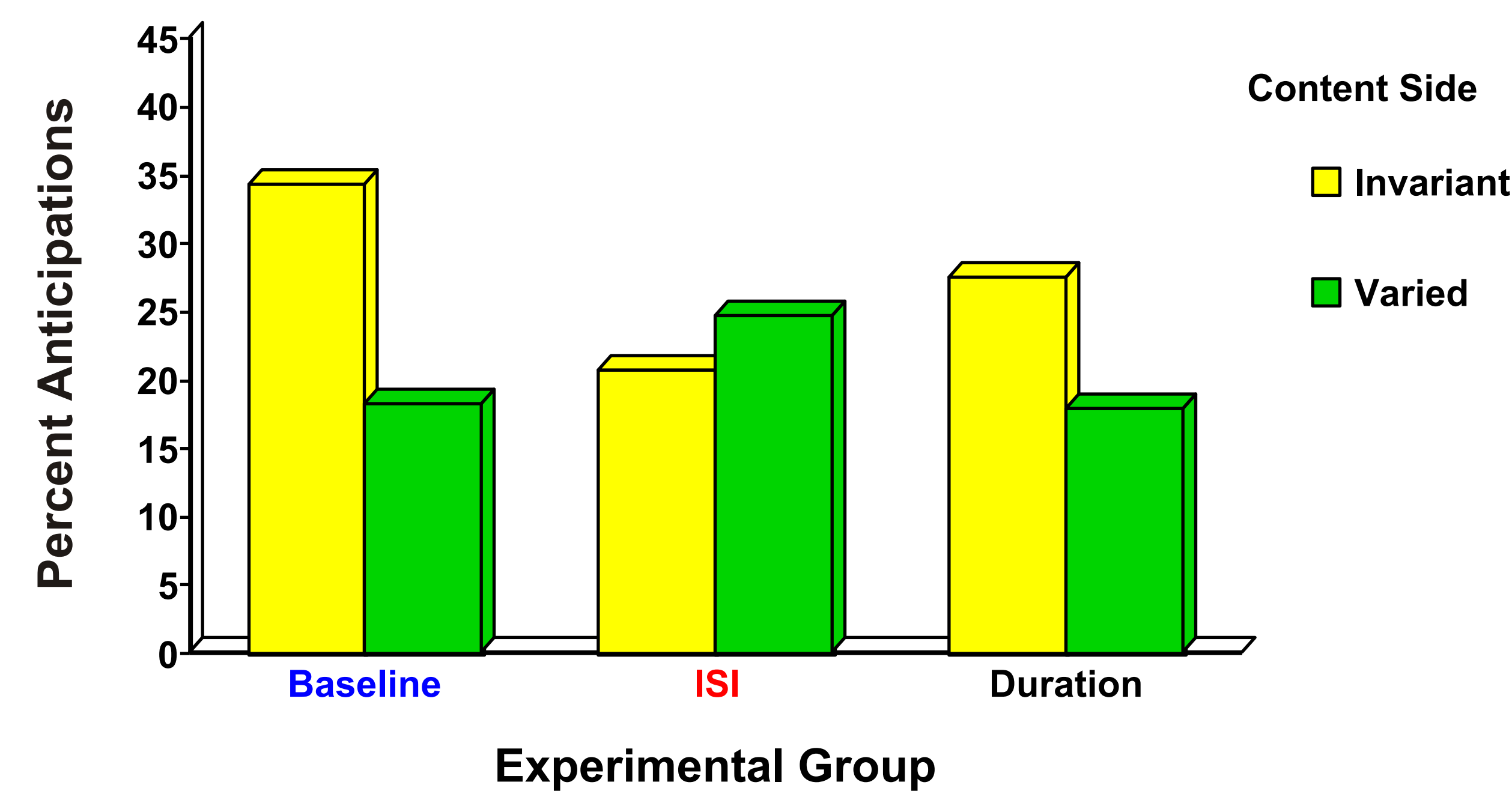
3. Exp. 1: Temporal Decay

Experimental Groups:



Infants were randomly assigned to either the **Baseline** group, the increased **ISI** group or the increase **Duration** group.

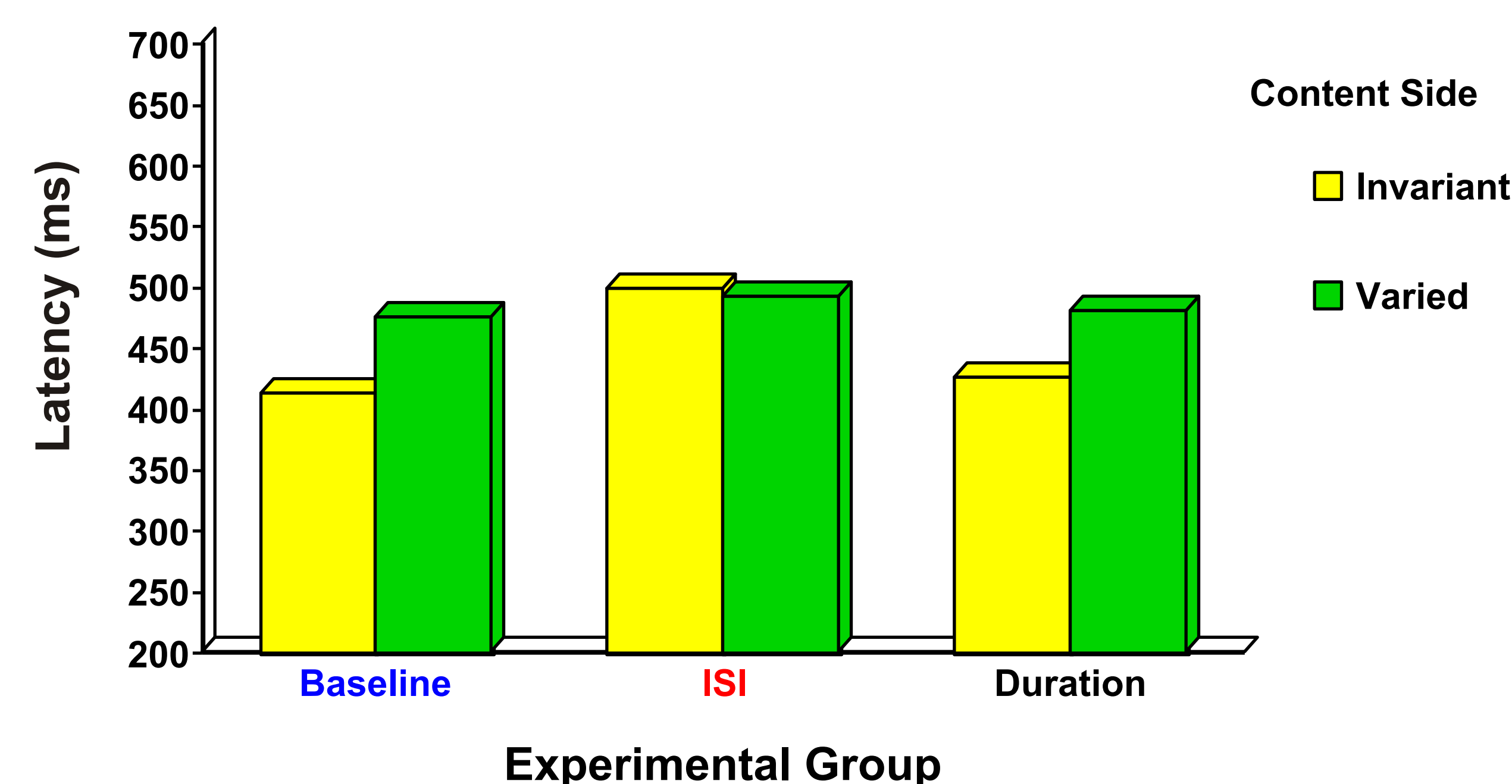
4. Effect of Temporal Decay on Anticipations



Infants made more anticipations to the **invariant** than the **varied** side in the **Baseline** and **Duration** groups.

Anticipations to the **invariant** side **decreased** when the interstimulus interval was increased in the **ISI** group.

5. Effect of Temporal Decay on Reactive Eye Movements

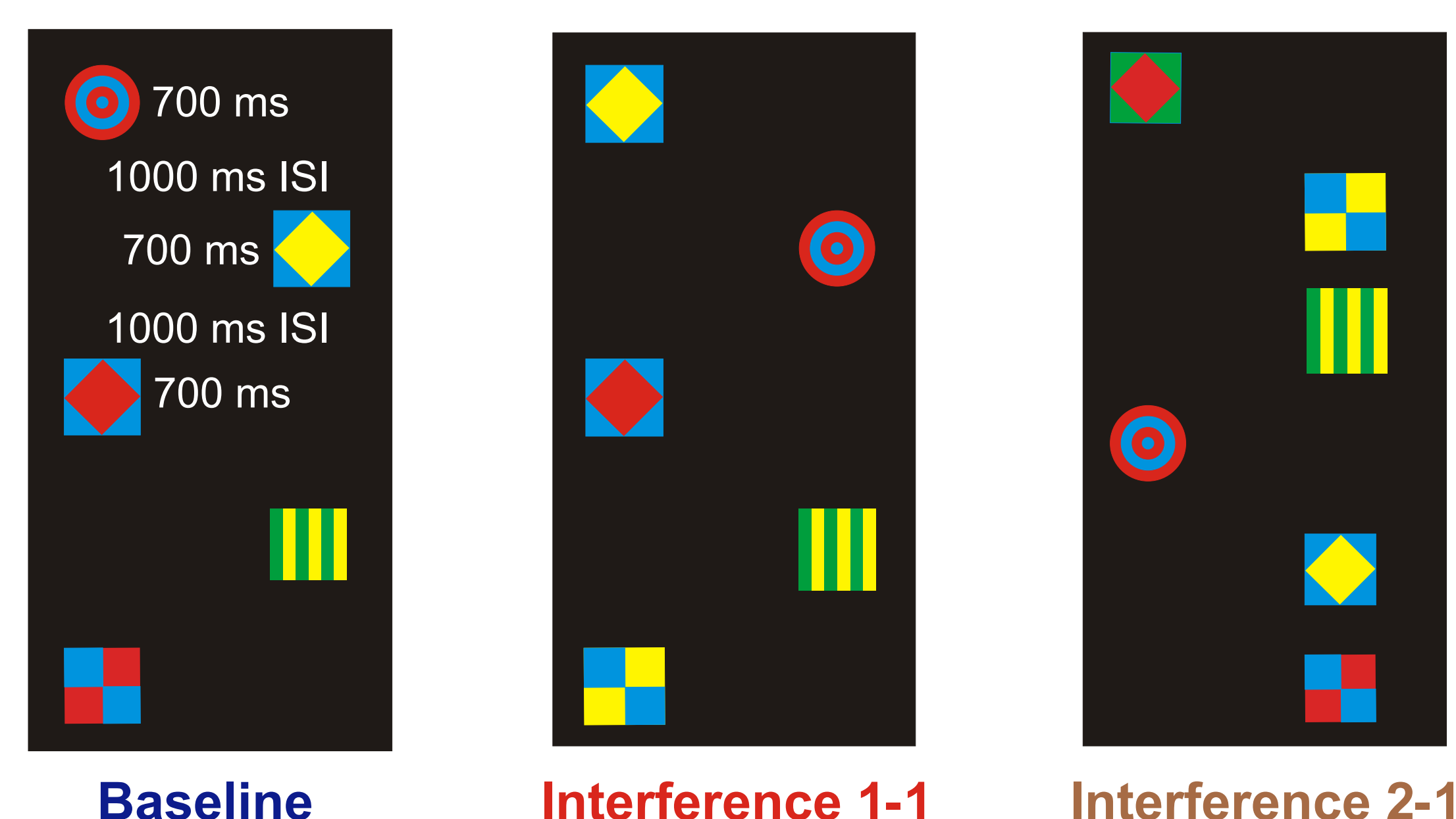


Latency of infants' reactive eye movements was nonsignificantly faster to the **invariant** than to the **varied** side in the **Baseline** and **Duration** groups.

Latency to the **invariant** side was equivalent to the **varied** side when the interstimulus interval was increased in the **ISI** group.

6. Exp. 2: Interference

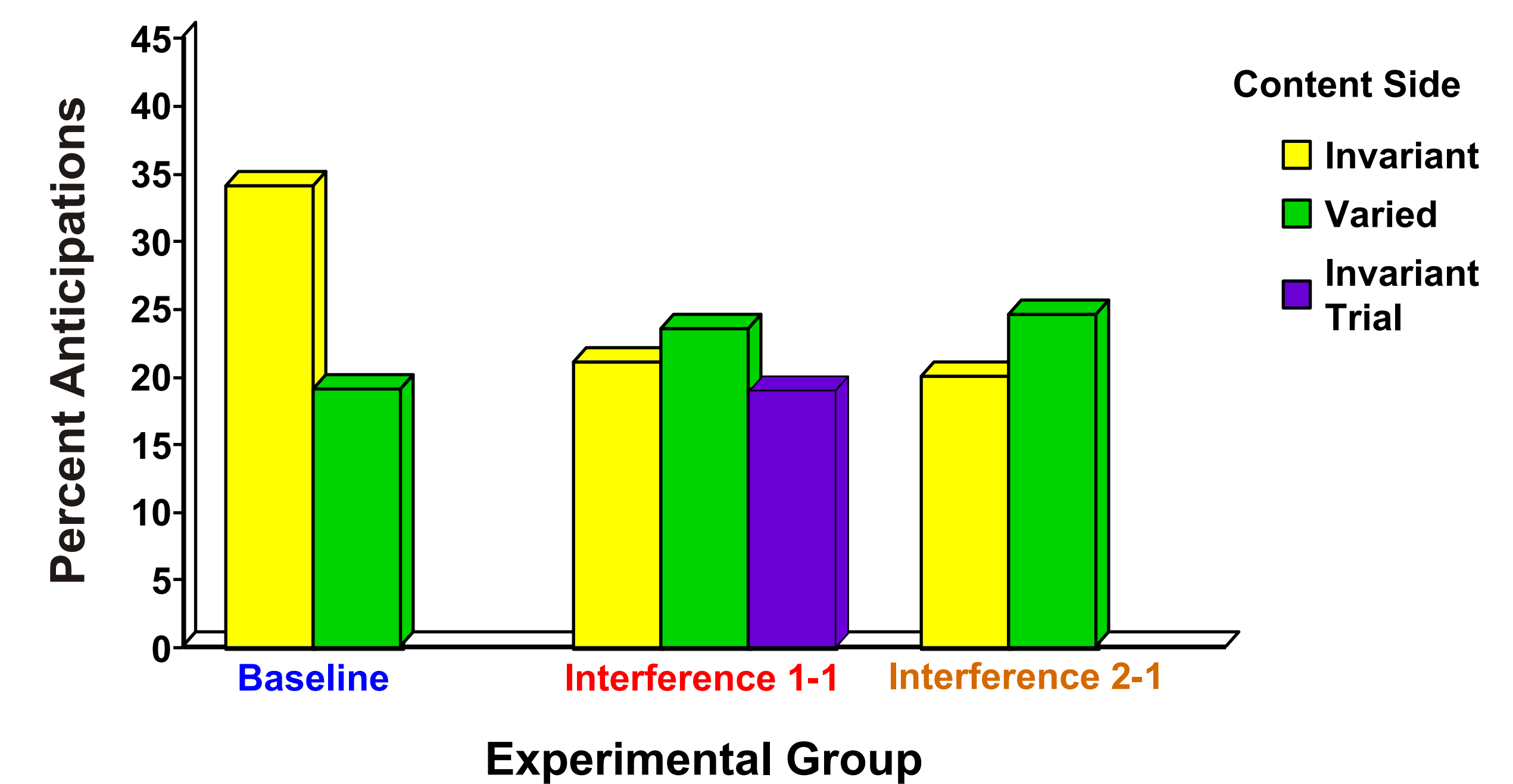
Experimental Groups:



Infants were randomly assigned to either the **Baseline** group, the **Interference 1-1** group, or the **Interference 2-1** group.

Stimulus duration and ISI were the same for all groups.

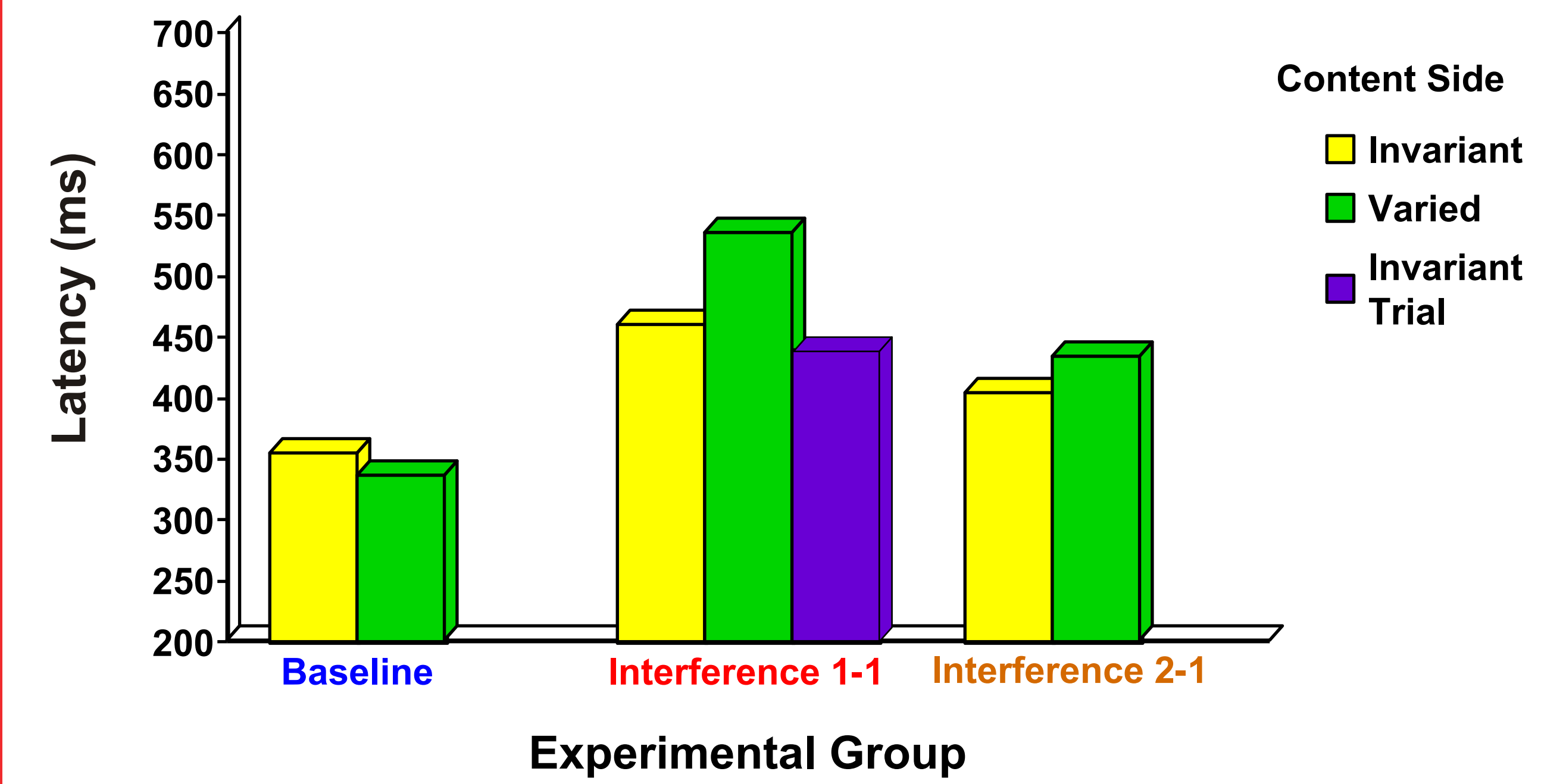
7. Effect of Interference on Anticipations



Infants made more anticipations to the **invariant** than the **varied** side in the **Baseline** group.

Anticipations to the **invariant** side **decreased** when an intervening non-invariant event was presented on the invariant side in the **Interference 1-1** and the **Interference 2-1** groups.

8. Effect of Interference on Reactive Eye Movements



Latency of infants' reactive eye movements was equivalent to the **invariant** and **varied** sides in the **Baseline** group.

Latency to the **invariant** and **varied** sides **increased** in the **Interference 1-1** and **Interference 2-1** groups.

9. CONCLUSIONS

1. More anticipations are made to invariant color events than to varied color events even though they are equally spatially predictable.
2. Anticipations to invariant events **decrease** when the temporal delay between invariant events is **increased**, whereas latency of reactive eye movements **increases**.
3. Introduction of an intervening non-invariant event between invariant events results in a **decrease** in anticipations to invariant events and an **increase** in the latency of reactive eye movements.

Results confirm that working memory is functioning at 3 months of age and that expectation formation is related to its functioning. Expectation formation was particularly sensitive to temporal decay, though a decrement in performance was evidenced due to interference. Finally, considering that expectations and working memory are localized in the frontal cortex in adults, these results suggest that the frontal cortex might be more functionally mature than previously believed.

REFERENCES
 Adler, S.A., & Haith, M.M. (2003). The nature of infants' visual expectations for event content. *Infancy*, 4, 389-421.
 Grossberg, S. (1995). The attentive brain. *American Scientist*, 83, 438-449.
 Haith, M.M., Hazan, C., & Goodman, G.S. (1988). Expectations and anticipation of dynamic visual events by 3.5-month-old babies. *Child Development*, 59, 467-479.
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