# How is Intentional Forgetting Reflected in Implicit Eye Movements?

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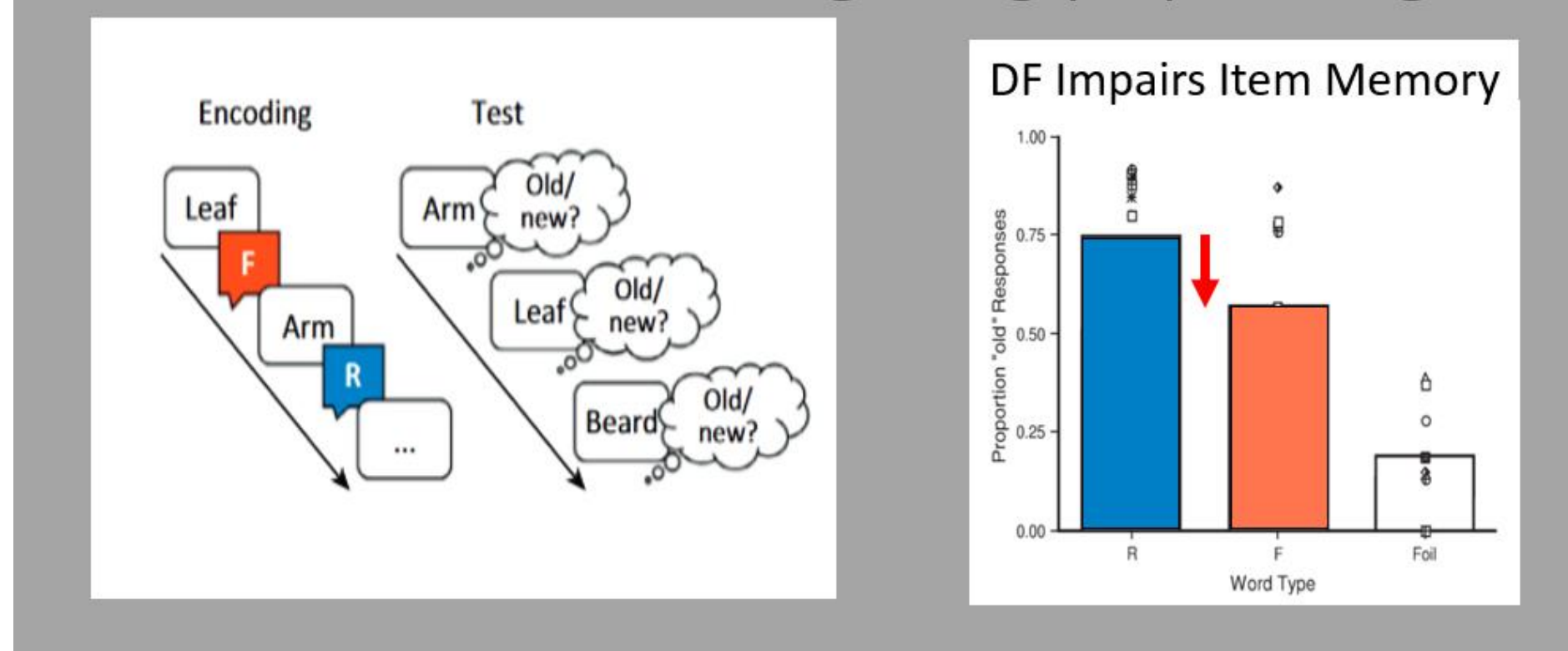
**CONTEXT, MEMORY, & FORGETTING LAB** — ILLINOIS

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## Rationale

**Can eye-movements differentiate between intentional and incidental forgetting?**

Item-Method Directed Forgetting (DF) Paradigm



DF Impairs Item Memory

- **Intentional** forgetting→ F-items that are subsequently forgotten
- **Incidental** forgetting→ R-items that are subsequently forgotten

- Typically, intentional forgetting investigates F-items that survive in memory despite the intention to forget (i.e., *unsuccessful* DF)
- A concurrent measure that accompanies behavior is needed to study F-items that are successfully forgotten

### Eye-Movements as an Implicit Indicator of Memory
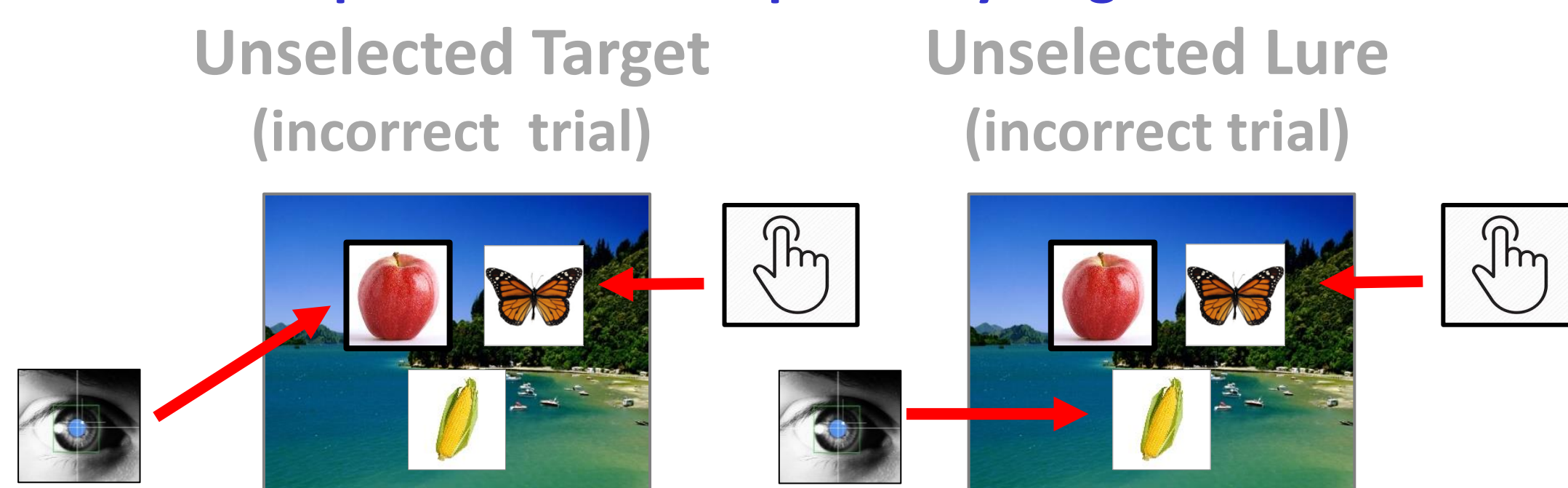
Examined two eye-movement effects:

1. **Preferential Viewing**→ Greater viewing to Selected Target compared to Selected Lure
   - Will DF reduce the magnitude of preferential viewing?

Selected Target (correct trial)    Selected Lure (incorrect trial)
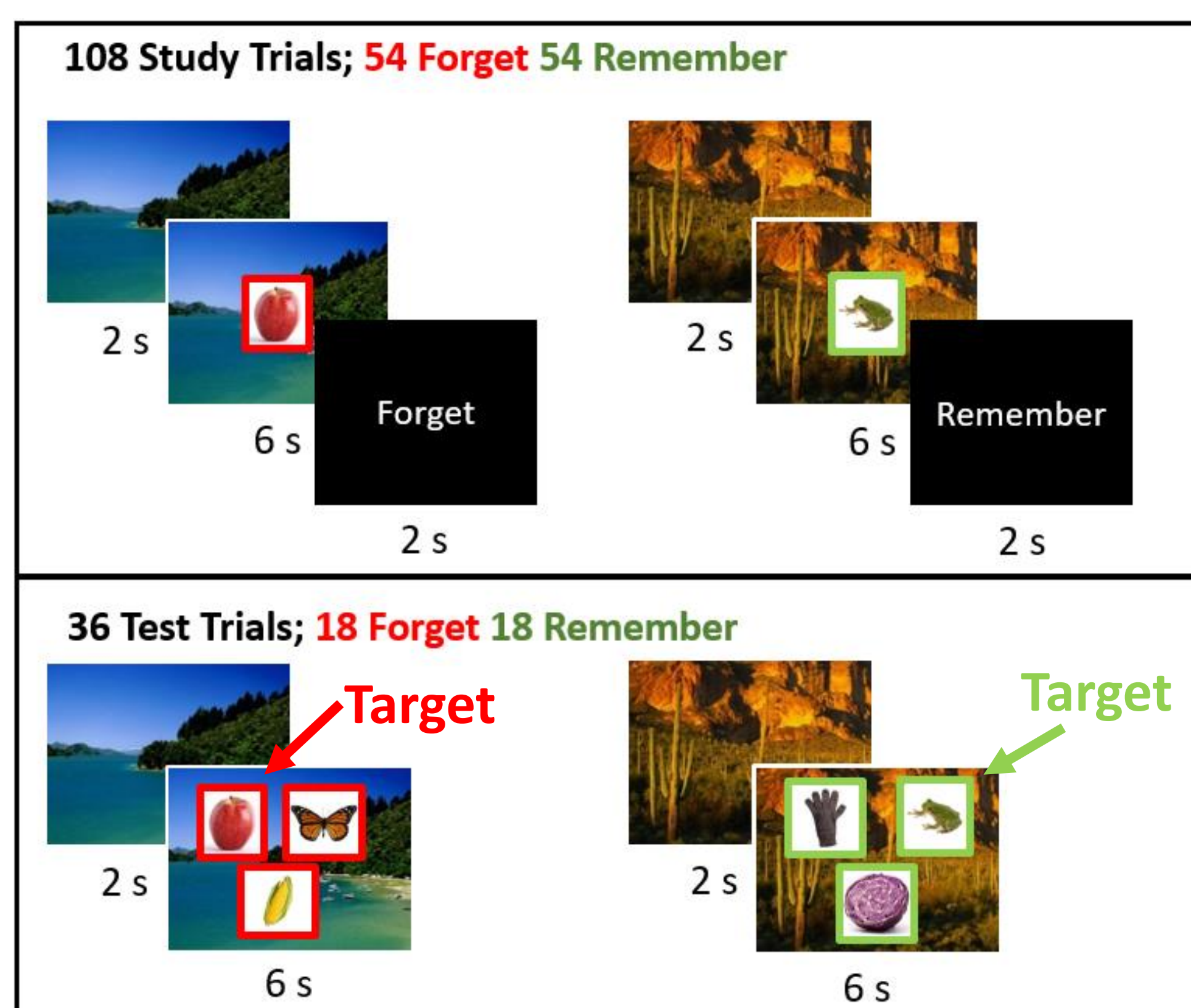


2. **Retained Memory Traces** → Greater viewing to Unselected Target compared to Unselected Lure
   - Will successful DF degrade memory representation of F-items more than the representations of passively forgotten R-items?
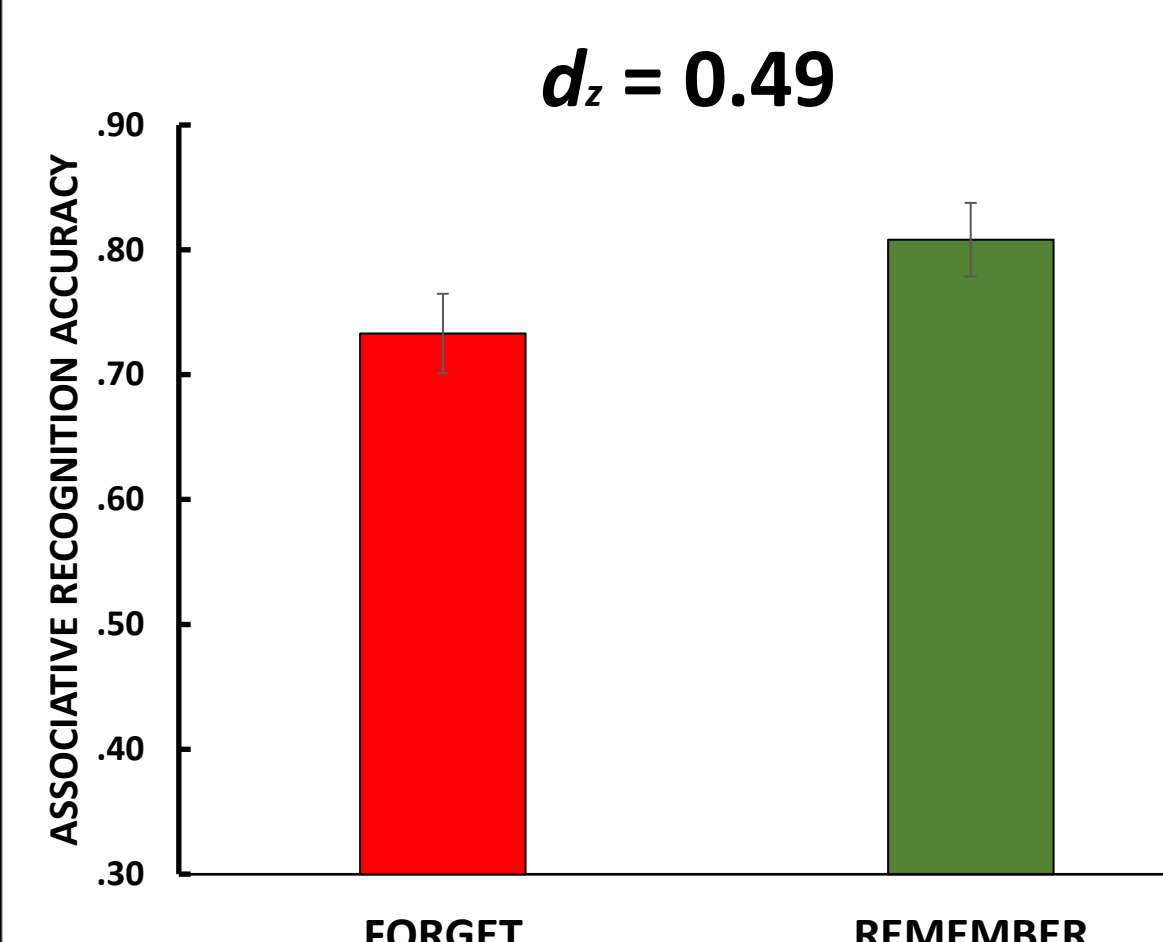
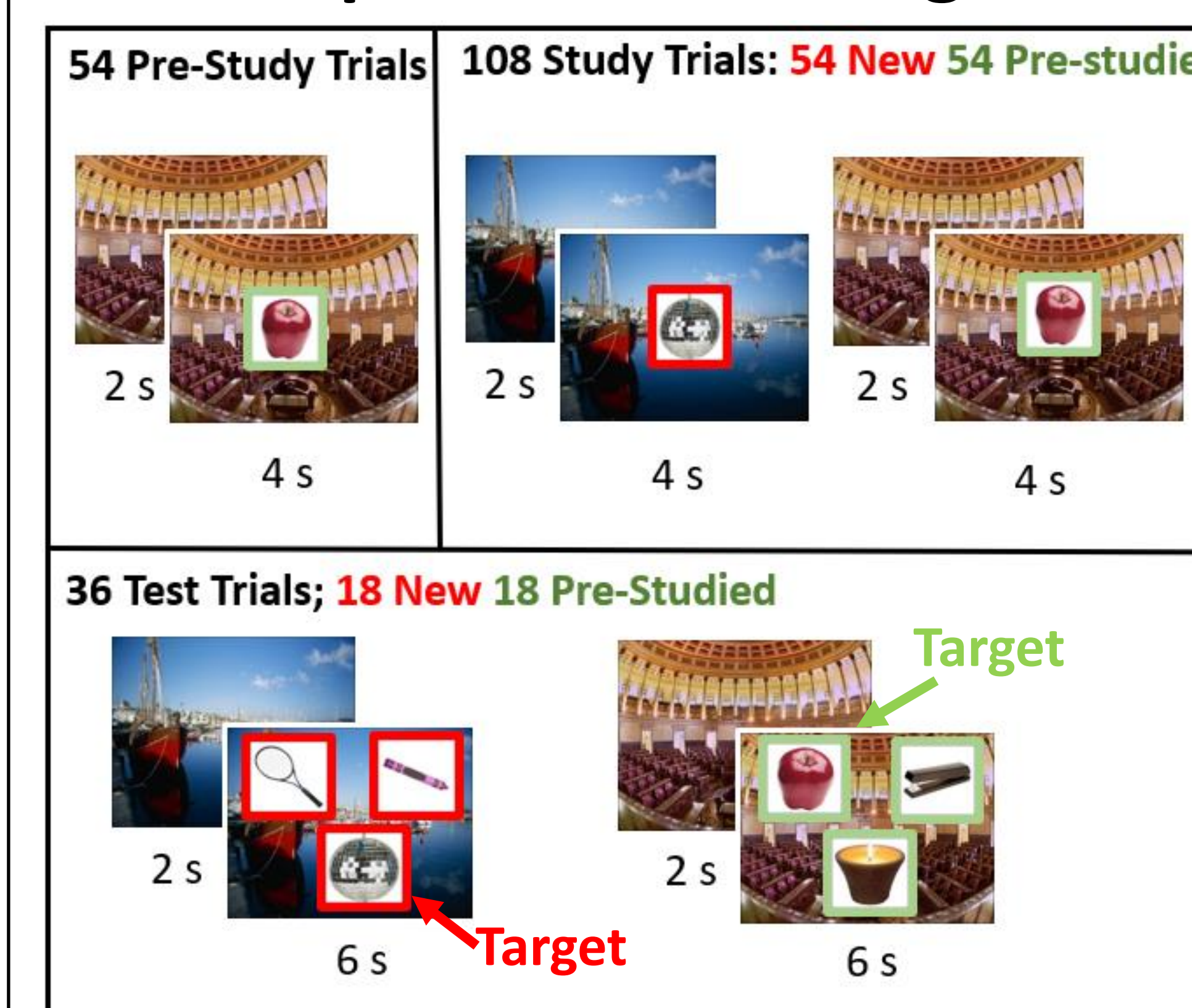Unselected Target (incorrect trial)    Unselected Lure (incorrect trial)
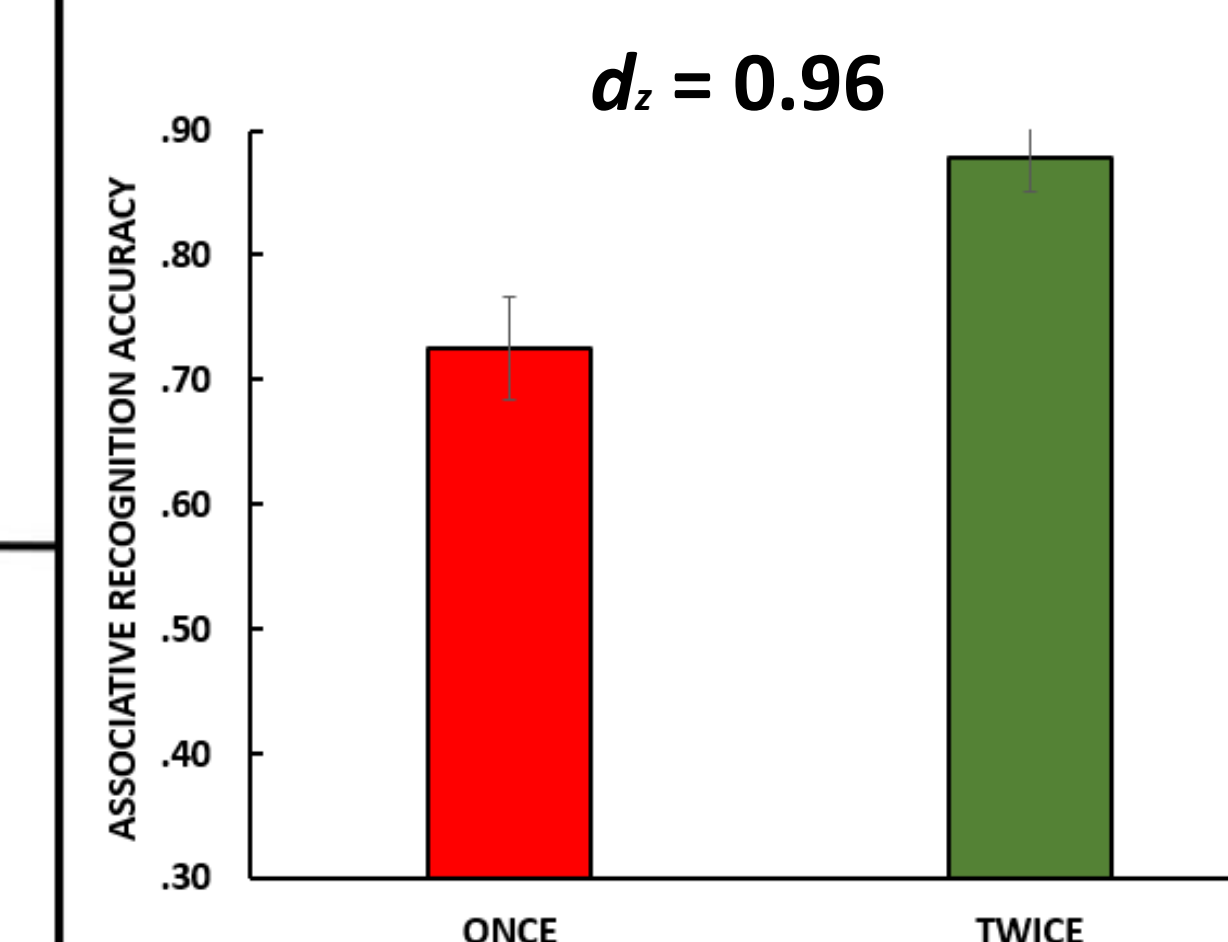


## Experiment 1 Design

108 Study Trials; **54 Forget** **54 Remember**



36 Test Trials; **18 Forget** **18 Remember**



### Behavioral Results

$d_z = 0.49$



## Experiment 1: Preferential Viewing

Viewing To Selected Objects



FORGET-SELECTED TARGET    REMEMBER-SELECTED TARGET
FORGET-SELECTED LURE    REMEMBER-SELECTED LURE
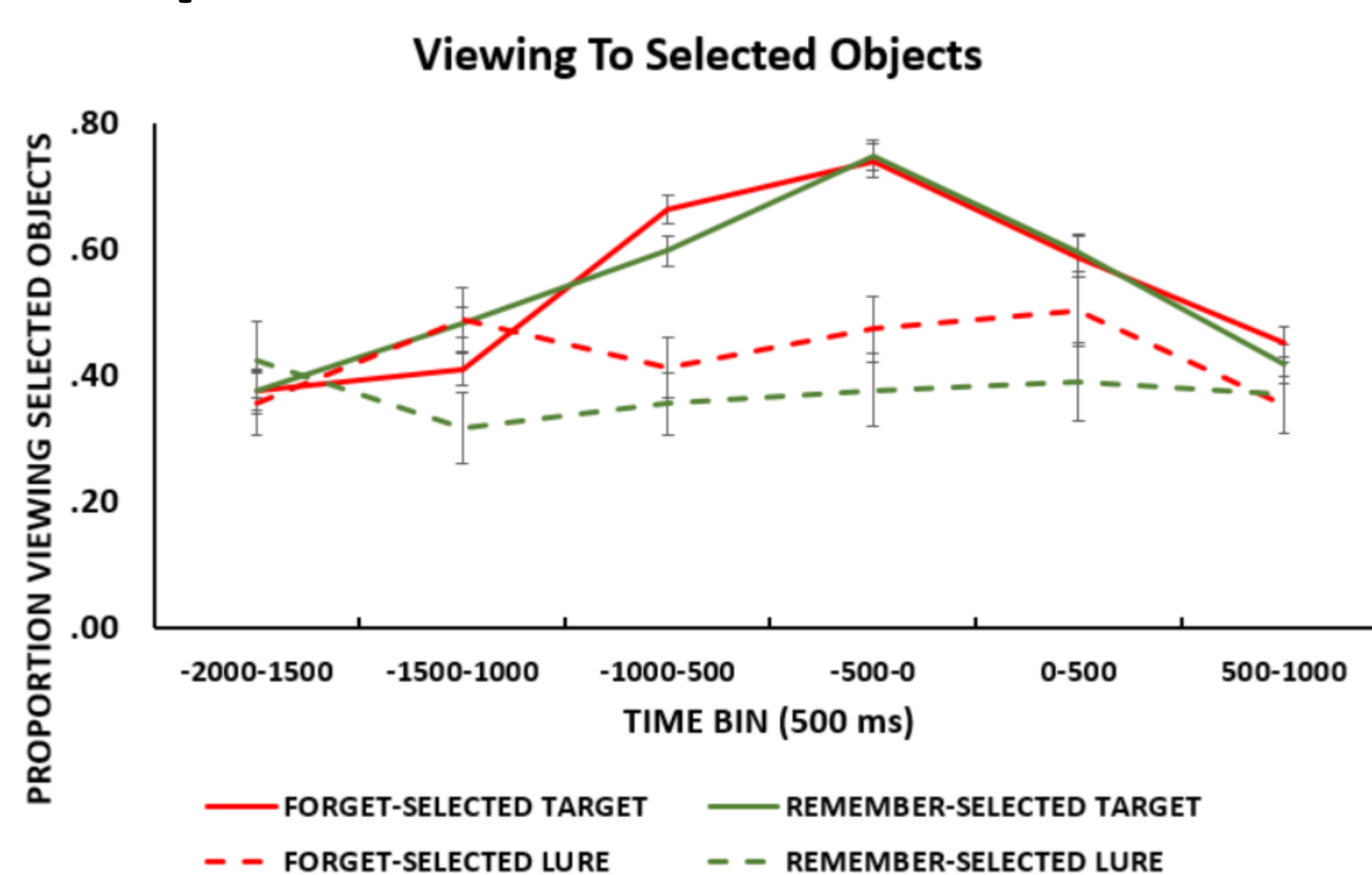
Intentional forgetting is reflected in reduced preferential viewing

This was due to <u>enhanced viewing to Selected Lures</u> in F condition

Unsuccessful DF does not differ from remembering

## Retained Traces in Intentional Forgetting

Viewing To Unselected Objects



FORGET-UNSELECTED TARGET    REMEMBER-UNSELECTED TARGET
FORGET-UNSELECTED LURE    REMEMBER-UNSELECTED LURE

Successful intentional forgetting degrades memory representations of F-items more than the representations of incidentally forgotten R- items

## Experiment 2 Design

54 Pre-Study Trials    108 Study Trials: **54 New** **54 Pre-studied**



36 Test Trials; **18 New** **18 Pre-Studied**



### Behavioral Results

$d_z = 0.96$



## Experiment 2: Preferential Viewing

Viewing To Selected Objects



ONCE-SELECTED TARGET    TWICE-SELECTED TARGET
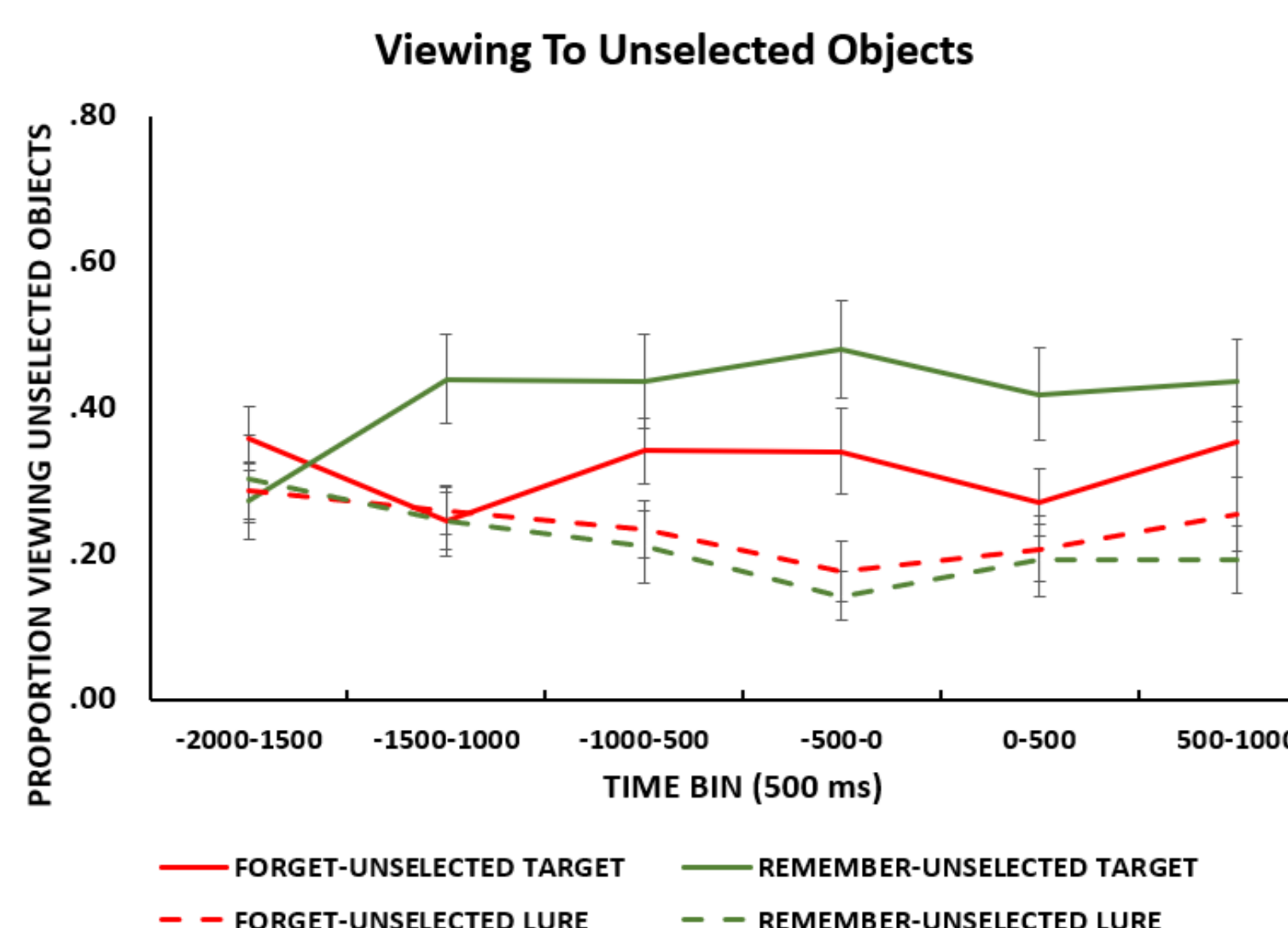ONCE-SELECTED LURE    TWICE-SELECTED LURE

Preferential viewing was reduced in weak condition (e.g., Once presented pairs)

This was due to <u>reduced viewing to Selected Targets</u> in weak condition
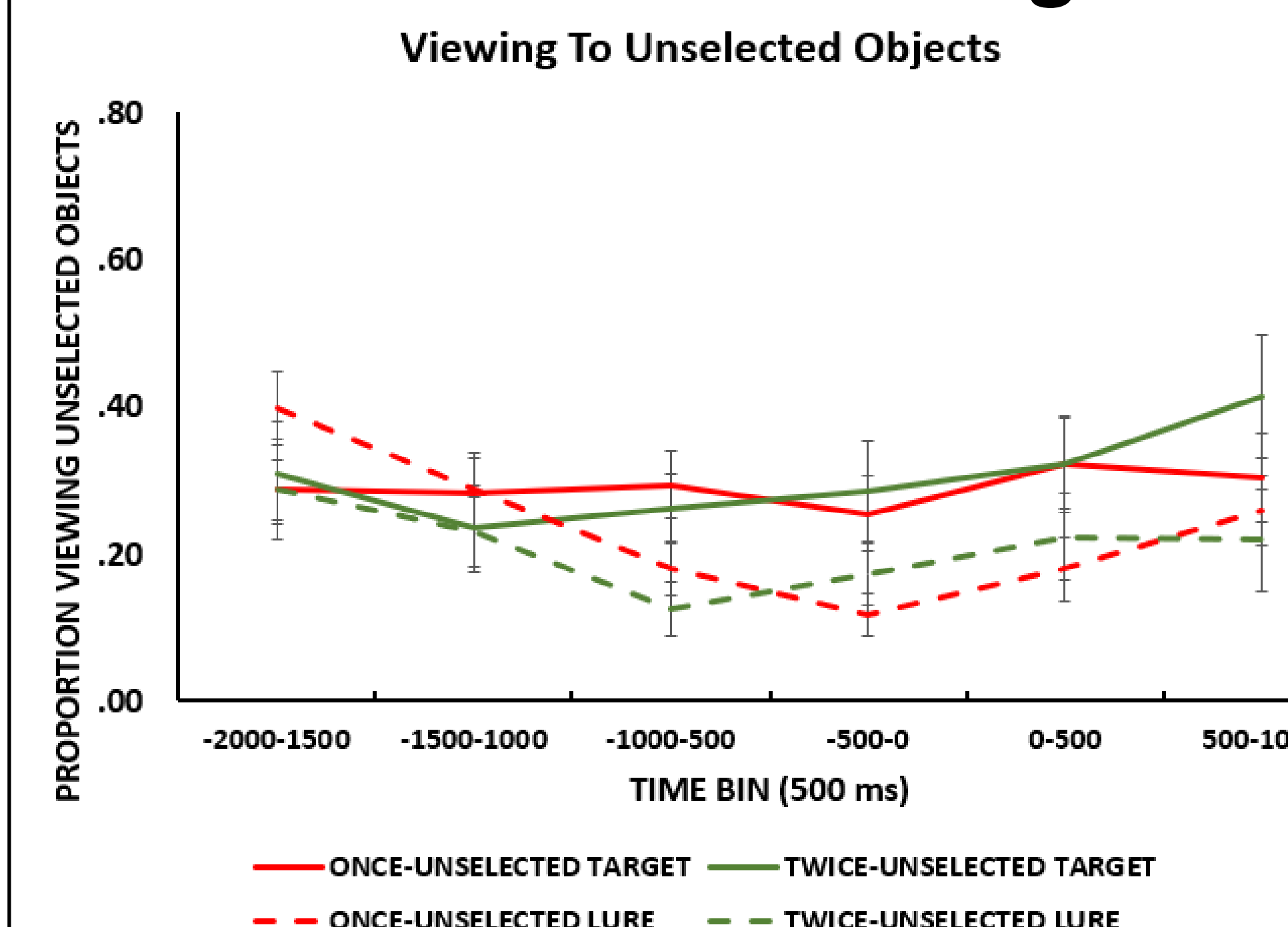
This is the opposite of what was found in the DF study

## Retained Traces in Strong and Weak Memories

Viewing To Unselected Objects



ONCE-UNSELECTED TARGET    TWICE-UNSELECTED TARGET
ONCE-UNSELECTED LURE    TWICE-UNSELECTED LURE

Similar degree of retained memory representations in Strong and Weak conditions

This is not what was found in the DF study

## Summary & Conclusions

Viewing patterns distinguished between Strong and Weak memories produced by DF instruction versus other manipulations that did not involve DF
   - Although both reduced the magnitude of preferential viewing, opposite viewing patterns were responsible for this reduction

Viewing patterns also distinguished between successful intentional forgetting and incidental forgetting that arises without intention to forget
   - Reduced evidence for retained traces during successful intentional forgetting compared to incidental forgetting

Overall, the eye movement findings indicate that a fundamentally different process is involved in successful intentional forgetting than incidental forgetting