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ABSTRACT

It has been shown that internally generated (thought or imagination) and externally generated (events, things, or people encountered in the past) autobiographical memories differ in characteristic ways. To examine the consequences of rehearsal on simulated perceived and imagined autobiographical memories, 36 undergraduate students participated in a 3-day experiment. During the first day, subjects perceived six situations and imagined another six situations. On the second day, subjects rated their memories for each of the situations, using a 7-point scale. They then were instructed to think about each situation 0, 4, or 8 times and were cued with an event label on each rehearsal trial. On the third day, subjects rehearsed the situations again, and rated their memories. Results showed that rehearsal affected some aspects of the memories but not others. For example, rehearsal had parallel effects on both perceived and imagined memories for all visual attributes. Perceived memories were sharper, had more colors, more visual details, and were more vivid than imagined memories. In addition, perceived memories were more detailed and more comprehensive than imagined ones, and subjects had less doubts and better overall memory for perceived than for imagined events. These findings agree with previous reality monitoring findings that people distinguish between memories for perceived and imagined events basing their judgments on the typical attributes of each type of memory. (The appendix contains the rating scale used in the study.) (KGB)

EFFECTS OF REHEARSAL ON PERCEIVED AND IMAGINED AUTOBIOGRAPHICAL MEMORIES

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Paper presented at the Annual Meeting of the Eastern Psychological Association, Boston, MA, March 21-24, 1985

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The term "autobiographical memory" refers to the recollection of memories that people have about their past experiences in life. In the present context, autobiographical memories generated from internal and external sources are going to be considered. Externally generated memories are derived from perceptual sources such as events, things, and people that have been encountered in the past. Internally generated memories are derived from self-initiated cognitive processes such as thought or imagination.

It has been previously shown (Johnson, 1983) that internally and externally generated autobiographical memories differ in characteristic ways. Compared to memories for imagined events such as dreams and fantasies, memories for perceived events, such as a party, a trip to the library, and a visit to the dentist, contain more sensory, contextual, or temporal information. That is, memories for perceived situations have more visual details, more taste, more information about the spatial arrangement of objects and people present in the scene, and more precise recollections about the year, season, day, and hour in which the event occurred than memories for imagined events. The reality

monitoring model proposed by Johnson & Raye (1981) suggests that such differences help people discriminate the origin, either internal or external, of their memories.

The current experiment examines the consequences of rehearsal for simulated perceived and imagined autobiographical memories. In an attempt to approach the complexity of autobiographical events, and still introduce some control, we decided to use laboratory simulations of real life events rather than events occurring in natural contexts. By using this approach, we could control and equate the content of perceived and imagined situations while approximating the complexity of natural memories.

We were particularly interested in which characteristics of memories are most affected by rehearsal. For example, rehearsal could affect all aspects of a memory equally. Or it could affect only some aspects such as the contextual or sensory information contained in the memory for the event.

We were also interested in the relative effects of rehearsal on perceived and imagined memories. That is, rehearsal could affect characteristics of perceived and imagined memories equally and, therefore, maintain any original difference between them (see upper part of Figure 1). On the other hand, rehearsal could have differential effects, thus either enlarging (see middle portion of Figure 1), or reducing (see lower part of Figure 1) any original differences between the two kinds of memories. Rehearsal might, for instance, preserve or increase sensory information more for imagined than for perceived events. If so,

one would expect judgments about the origin of the situations to become less accurate over time. Rehearsal would then be a potential mechanism in creating confusions between memories for perceived and imagined events.

Subjects. Thirty six undergraduate students from the State University of New York at Stony Brook participated in the study.

Procedure. The experiment was conducted on 3 consecutive days. During the first session, subjects perceived six situations and imagined another six situations. The events were things such as writing a letter, being introduced to an Indian woman... (see Table 1).

On perceptual trials, subjects were given a piece of paper and actually wrote a brief letter; or were actually introduced to an Indian woman.

On imagined trials, subjects were read a script describing the situation as closely to its perceived version as possible. For example, a portion of the script describing the Indian woman goes as follows: "...Imagine that there is an Indian woman in this room talking to you. Try to imagine her as clearly and vividly as possible. She has typical Indian features: slim figure, dark skin, long black hair. Imagine that she is standing in front of you wearing a bright, colorful sari." Situations were counterbalanced so that any given one was perceived and imagined by an equal number of subjects.

During the second session, subjects rated their memories for each one of the situations, using 7-point rating scales for each of several dimensions (see Appendix). For example, subjects

rated sensory features such as amount of color in the memory; contextual features such as location; emotional aspects such as how positive or negative they felt; and structural aspects such as how complex the overall story line of the memory seemed to be. Subjects then were instructed to think about each situation either 0, 4, or 8 times. On each rehearsal trial, subjects were cued with an event label such as "Think about the clay pot" or "Think about the Indian woman" and were allowed 15 seconds to do so. Particular events were assigned equally often across subjects to numbers of rehearsals.

During the third session subjects rehearsed the situations again; thus by the end of the last session, subjects had thought 16 times about some situations, 8 times about some others, and no times about others. At the end of the third session subjects again rated their memories for the situations.

Of major interest is the comparison of ratings made before and after the rehearsals.

Results. In order to compare initial and post rehearsal ratings, a 2x4 within subjects ANOVA was performed for each rating scale collapsed across all situations. The two factors in the analysis were the origin of the situation - perceived vs. imagined - and rehearsal - before, after 0, after 8, and after 16 rehearsals. Indicated subsequent analyses were then conducted. An alpha level of .01 was adopted.

Rehearsal affected some aspects of the memories but not others. First we are going to examine the memory characteristics that were affected by the instructions to think about the events.

Rehearsal had parallel effects on both perceived and imagined memories for all visual attributes (see Figure 2). Significant main effects for both origin of the situation and number of rehearsals were present in all visual items. Overall, perceived memories were sharper, had more colors, more visual details, and were more vivid than imagined memories. If not rehearsed, the availability of visual information diminished. If situations were rehearsed, initial levels were maintained, but not exceeded. Origin of the situations and number of rehearsals did not interact. When subsequent analyses were performed for each situation separatedly, this pattern was found in 11 out of the 12 situations for all visual aspects.

Questions assesing the amount of detail, how confusing the memory seemed, and whether subjects felt any doubts about the accuracy of the memory followed a pattern very similar to the visual attributes (see Figure 3): In general, perceived memories were more detailed and more comprehensible than imagined ones; participants had also less doubts and better overall memory for perceived than for imagined events. If not rehearsed, perceived and imagined memories were more sketchy, confusing, and doubtful than either before or after several rehearsals. No interactions were present. When situations were analyzed separatedly, this pattern was found in 9 out of the 12 situations.

The item assessing the complexity of the story line yielded a significant origin x rehearsal interaction (see Figure 4). There were no initial differences in terms of complexity between perceived and imagined situations. This seems reasonable because

the situations were the same across subjects. If not rehearsed, the complexity of memories for perceived situations decreased; if rehearsed, it increased until it reached initial levels of complexity. The opposite occurs with the imagined versions of the situations: lack of rehearsal increases their complexity, whereas many rehearsals made the complexity decrease toward original levels. Even though we do not have a clear explanation for this finding, we do know now that it replicates because we found the same pattern of results for complexity in a subsequent study.

On the other hand, as it was mentioned earlier, some characteristics of memories appeared to become less availabe over time and instructions to rehearse had no effect (see Figure 5). For example, rehearsal did not affect memory for the sound, touch, temperature, what people thought at the time of the event, and how much the situation revealed about themselves.

Implications and Conclusions. Thus, when instructed to think about situations like those presented in the study people do not seem to focus in all aspects contained in the original event. Instructions to rehearse the events had an effect on visual aspects, overall memory, and lack of confusions and doubts about the accuracy of subjects recollections. Rehearsal maintained original differences between perceived and imagined memories in those aspects, but it neither increased nor reduced the differences.

The present findings are in agreement with and extend previous reality monitoring findings. People distinguish between

memories for perceived and imagined events basing their judgements on the typical attributes of each type of memory (Raye & Johnson, 1980). When subjects are asked about their reasons to believe that something happened or they just imagined it (Johnson, 1985), they often refer to perceptual and contextual attributes of the situation as evidence for its occurrence and sometimes to the lack of those attributes as evidence for mere imagination. If, as indicated by the present results, initial differences in perceptual and contextual attributes are maintained even after people think repeatedly about the situations it should help people discriminate the origin of their memories. Otherwise, we would expect people to confuse memories for what is seen with memories for what is imagined much more frequently. If equal rehearsal of perceived and imagined events does not reduce the differences between the memories for the events, rehearsal per se is not the mechanism by which reality monitoring judgments decrease over time.

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Table 1

Situations included in the experiment

Meet an Indian Woman

Have coffee with cookies

See two pictures of people

Visit a work room in the Psychology Department

Introduce oneself

Write a letter to the president of the University

Meet a Korean woman

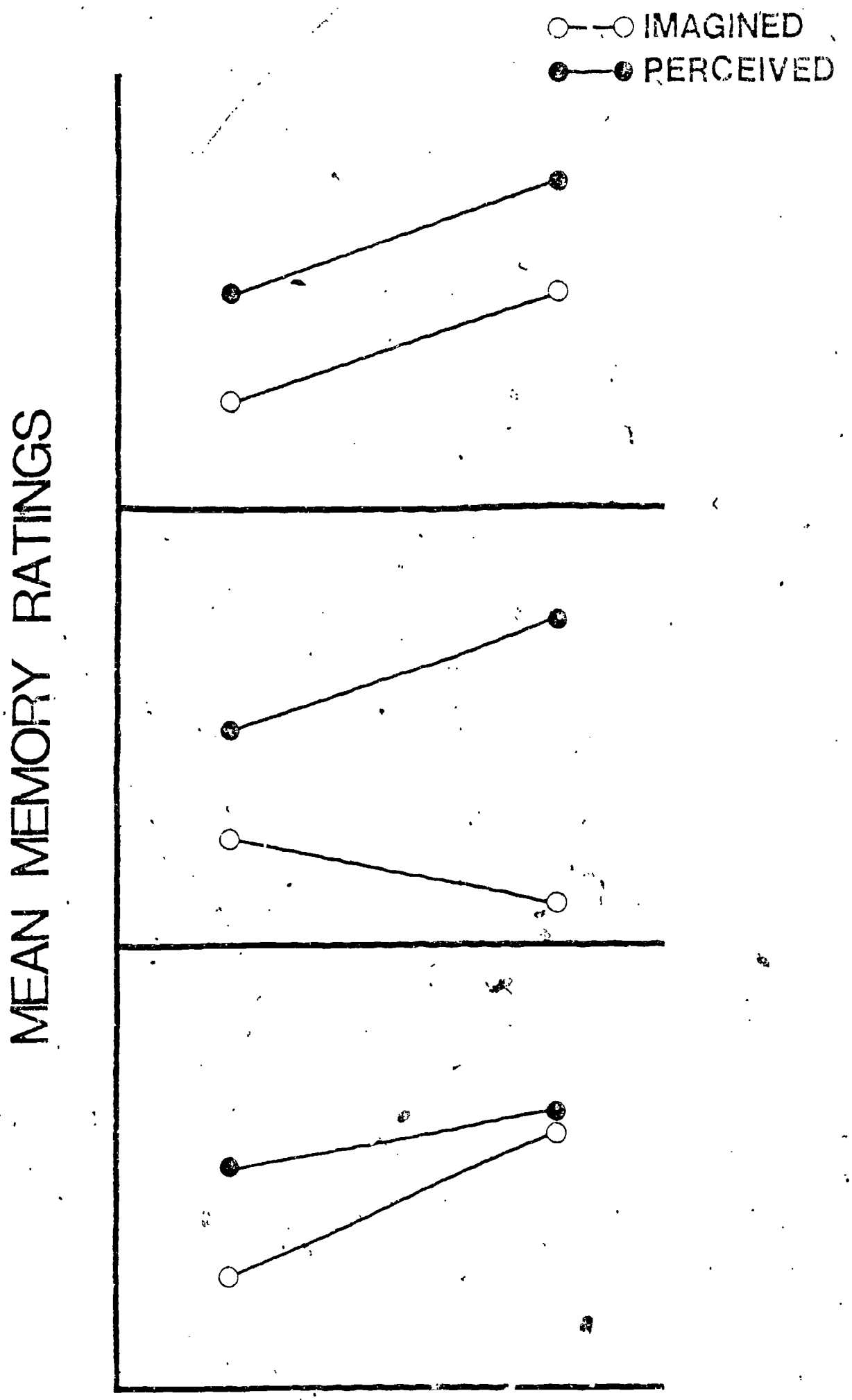
Make a pot with clay

Visit a Psychology computer laboratory

Make an abstract collage

See three pictures of works of art

Have a soda with munchies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MEAN MEMORY RATINGS
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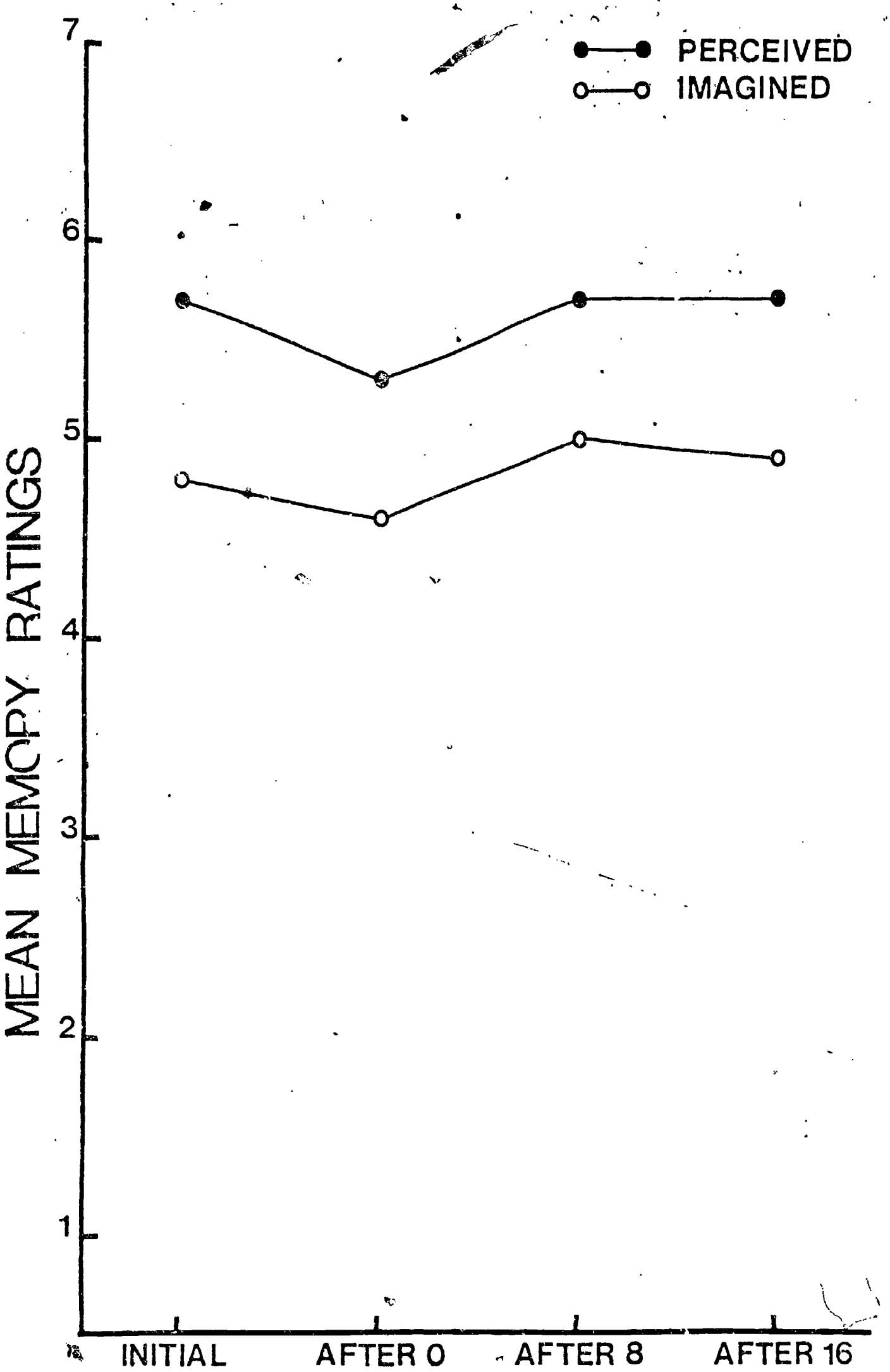
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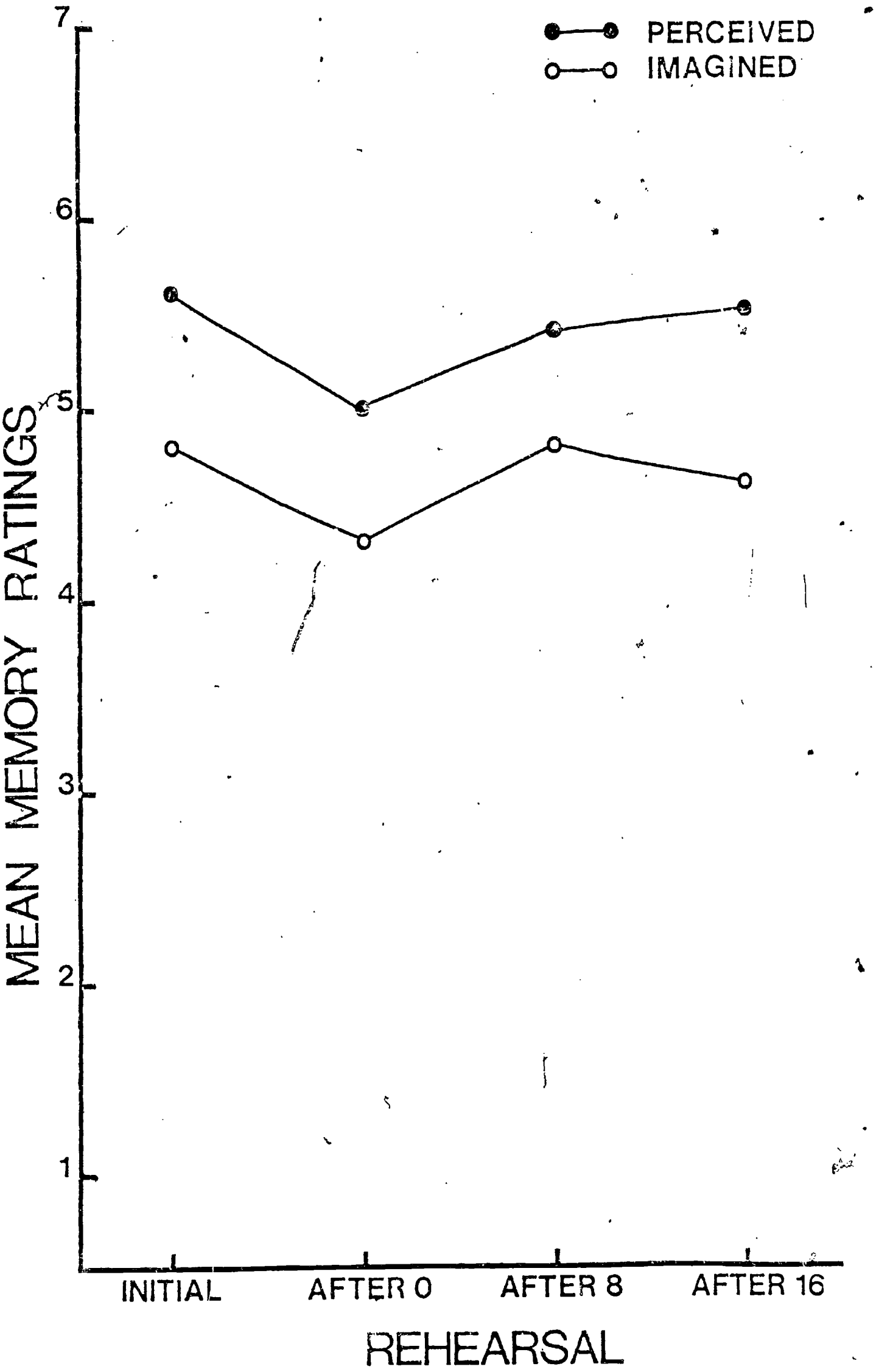
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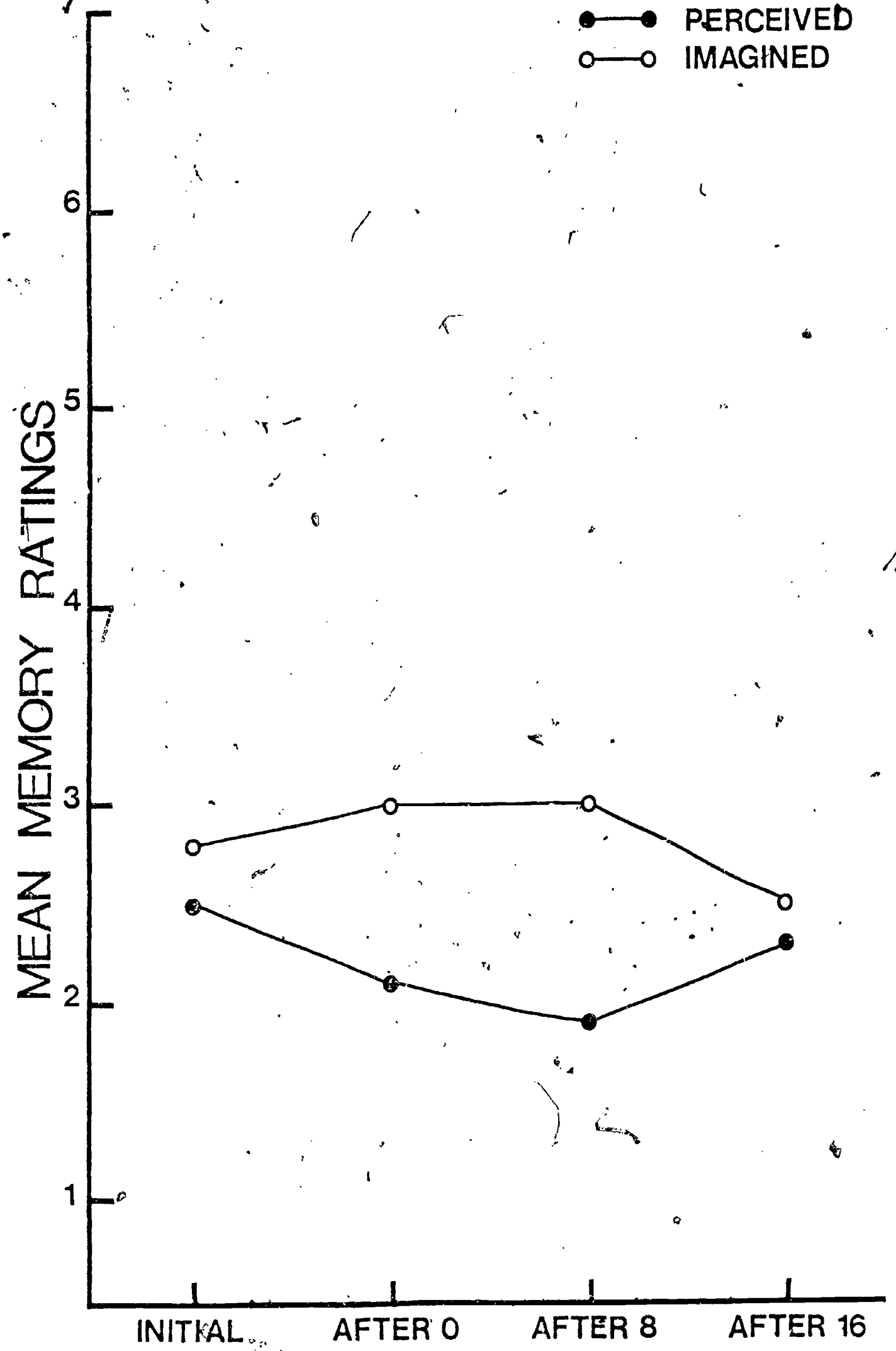
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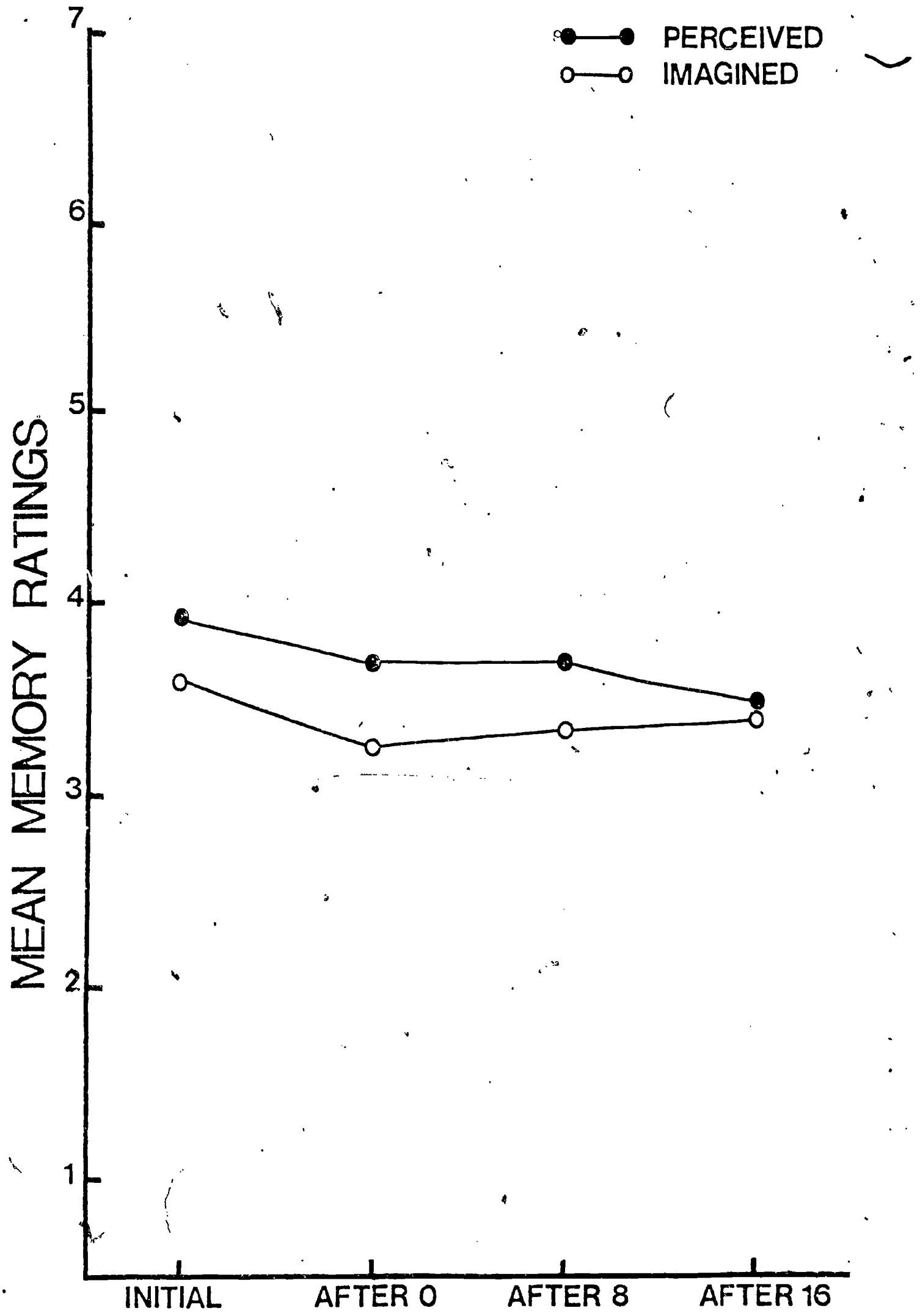
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REHEARSAL

Appendix

Questionnaire

My memory for this event is (or involves):

1. dim 1 2 3 4 5 6 7 sharp/clear
2. black and white 1 2 3 4 5 6 7 entirely in color
3. Visual detail little or none 1 2 3 4 5 6 7 a lot
4. Sounds ------ little or none 1 2 3 4 5 6 7 a lot
5. Smell ------- little or none 1 2 3 4 5 6 7 a lot
6. Touch ------- little or none 1 2 3 4 5 6 7 a lot
7. Tastes ------ little or none 1 2 3 4 5 6 7 a lot
8. Temperature

   (warmth) - little or none 1 2 3 4 5 6 7 a lot
9. Overall vividness is - vague 1 2 3 4 5 6 7 very vivid
10. My memory for the

    event is -- sketchy 1 2 3 4 5 6 7 highly detailed
11. Order of events is confusing

    or disjointed 1 2 3 4 5 6 7 comprehensible
12. Story line is ------- simple 1 2 3 4 5 6 7 complex
13. ----- bizzarre 1 2 3 4 5 6 7 realistic
14. There is no "story", only a ---- (check box if

    single image or idea ---- applicable)
15. My memory for the location where the event

    takes place is: ------ vague 1 2 3 4 5 6 7 clear/distinct
16. General setting is

    unfamiliar 1 2 3 4 5 6 7 familiar
17. Relative spatial arrangement of objects in my memory

for the event is: ---- vague 1 2 3 4 5 6 7 clear/distinct

18. Relative spatial arrangement of people in my memory for the event is: ---- vague 1 2 3 4 5 6 7 clear/distinct

19. Event seems: --------- short 1 2 3 4 5 6 7 long

20. Overall tone of memory:

negative 1 2 3 4 5 6 7 positive

21. In this event I was:

a spectator 1 2 3 4 5 6 7 participant

22. At the time this event seemed like it would have serious implications:

not at all 1 2 3 4 5 6 7 yes,definitely

23. Looking back, this event did have serious implications: not at all 1 2 3 4 5 6 7 yes,definitely

24. I remember how I felt at the time the event took place: not at all 1 2 3 4 5 6 7 clearly

25. Feelings, at the time, were:

negative 1 2 3 4 5 6 7 positive

26. not intense 1 2 3 4 5 6 7 very intense

27. As I am remembering now, my feelings are: not intense 1 2 3 4 5 6 7 very intense

28. I remember what I thought at the time:

not at all 1 2 3 4 5 6 7 clearly

29. This memory reveals or says about me:

not much 1 2 3 4 5 6 7 a lot

30. Overall, I remember this event:

hardly 1 2 3 4 5 6 7 very well

31. I remember events that happened in advance to

this event: not at all 1 2 3 4 5 6 7 yes, clearly

32. I remember events that happened after the event:

not at all 1 2 3 4 5 6 7 yes, clearly

33. Do you have any doubts about the accuracy of your memory for this event?

a great deal of doubt 1 2 3 4 5 6 7 no doubt whatsoever

34. Since it happened, I have thought about this event:

not at all 1 2 3 4 5 6 7 many times

35. I have talked about it:

not at all 1 2 3 4 5 6 7 several times

36. Have you had other experiences similar to this event?

no, the event is unique 1 2 3 4 5 6 7 yes, quite frequently