Phenomenal Characteristics of Memories for Perceived and Imagined Autobiographical Events

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Two studies explored potential bases for reality monitoring (Johnson & Raye, 1981) of naturally occurring autobiographical events. In Study 1, subjects rated phenomenal characteristics of recent and childhood memories. Compared with imagined events, perceived events were given higher ratings on several characteristics, including perceptual information, contextual information, and supporting memories. This was especially true for recent memories. In Study 2, subjects described how they knew autobiographical events had (or had not) happened. For perceived events, subjects were likely to mention perceptual and contextual details of the memory and to refer to other supporting memories. For imagined events, subjects were likely to engage in reasoning based on prior knowledge. The results are consistent with the idea that reality monitoring draws on differences in qualitative characteristics of memories for perceived and imagined events (Johnson & Raye, 1981) and augment findings from more controlled laboratory studies of complex events (Johnson & Suengas, in press; Suengas & Johnson, 1988).

Reality monitoring refers to the processes by which perceived and imagined events are discriminated and confused in memory (Johnson & Raye, 1981). The framework proposed by Johnson and Raye assumes that reality monitoring is a function of characteristics of memories and of judgment processes. Briefly, Johnson and Raye suggested that memories originating from perception should have more perceptual information (e.g., color and sound), more contextual information (time and place), and more meaningful detail, whereas memories originating from thought should have more information about the cognitive operations (e.g., sensory, perceptual, or reflective processes, see Johnson, 1983) that generated them. These differences in memories reflect, of course, differences in perception and imagination as originally experienced. Differences in average value along these dimensions or aspects can form the basis for deciding whether the origin of a memory is internal or external. For example, a memory with a great deal of visual and spatial detail, and without cues suggesting this information was reflectively generated (e.g., without records of intentional constructive and organizational processes), should be judged to have been externally derived.

According to the Johnson-Raye (1981) framework, reality monitoring decisions may also involve reasoning processes based on additional information from memory. For example, a person might correctly attribute a memory of a conversation to a fantasy on the basis of the knowledge that he or she is not acquainted with that person. In addition, judgments will

be affected by people's opinions or by "metamemory" assumptions about how memory works. Thus there are at least two ways for reality monitoring to break down: A target memory may be uncharacteristic of its class (e.g., an especially vivid imagination), or the person may fail to engage in reasoning on the basis of prior knowledge or may engage in faulty reasoning.

Work on reality monitoring has largely used simple materials presented in the laboratory: for example, individual words (Foley, Johnson, & Raye, 1983; Johnson, Foley, & Leach, 1988; Johnson, Raye, Foley, & Foley, 1981; Johnson, Taylor, & Raye, 1979; Rabinowitz, in press; Raye & Johnson, 1980; Raye, Johnson, & Taylor, 1980), words in phrases or sentences (Anderson & Patterson, 1988; Durso, Reardon, & Jolly, 1985; Johnson, Raye, & Durso, 1980), geometric stimuli and pictures of objects (Finke, Johnson, & Shyi, 1988; Johnson, Raye, Wang, & Taylor, 1979), and simple actions (Anderson, 1984; Foley & Johnson, 1985). Results of these experiments generally support the proposed differences in characteristics of memories for perceived and imagined events and the importance of these differences in reality monitoring processes.

With the exception of a study of people's ability to distinguish dreams they had reported to a partner from dreams the partner reported to them (Johnson, Kahan, & Raye, 1984), reality monitoring of naturally occurring autobiographical events has not been explored systematically (although there are occasional relevant observations, e.g., see Neisser's, 1981, interesting analysis of John Dean's testimony at the Watergate hearings). There are at least two important reasons to investigate this area of memory. One is to see if the same characteristics of memories that are important in the laboratory are important in more natural contexts. The other is that autobiographical memories are embedded in a complex set of relations with other memories and general knowledge (e.g.,

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see chapters in Rubin, 1986). This rich network provides the basis for the sorts of reasoning processes that we have postulated sometimes contribute to reality monitoring decisions.

The two studies reported here were designed to extend the Johnson–Raye (1981) reality monitoring framework to memory for autobiographical events. Furthermore, they provide converging evidence, along with results from more controlled studies with simulated autobiographical events (Johnson & Suengas, in press; Suengas & Johnson, 1988), of the potential usefulness of examining phenomenal characteristics of memories for complex events for understanding the nature of remembering (Johnson, 1988).

Study 1

Subjects remembered a perceived and an imagined autobiographical event that occurred recently or in their childhood. They then rated each event on a number of scales designed to assess a wide range of characteristics of the memories (e.g., visual detail, spatial and temporal information, emotional intensity, complexity).

Method

Design and subjects. Two variables were of interest: The origin of the memory (perceived vs. imagined) was a within-subjects variable, and the age of the memory (recent vs. childhood) was a between-subjects variable. The subjects were 72 male and female undergraduate students from the State University of New York at Stony Brook; they received course credit for their participation. Our primary interest was comparing subjects' ratings of qualitative characteristics of memories for perceived and imagined events. For generality, we also varied when the memories were established (during childhood or more recently). The initial representation of autobiographical events may change with cognitive development (e.g., Fitzgerald, 1986); furthermore, the nature of the information available in autobiographical memories may change over time (Linton, 1986). In Studies 1 and 2, the age at which a memory was established was confounded with the age of the memory (i.e., retention interval). Although the present design does not allow us to specify the individual contributions of these two factors to differences in remembered recent and childhood events, we can explore whether their joint contribution is similar for perceived and imagined events.

Materials and procedure. Subjects were asked to remember a social occasion, a trip to the library, or a visit to the dentist. These perceived events were selected because they were likely to differ in many ways, for example, degree of social interaction and type and intensity of emotional tone. Subjects were also asked to remember a dream, a fantasy, or an unfulfilled intention. These imagined events differed in degree of conscious construction and degree of potential realization. Thus we attempted to include a relatively broad representation of events of each type.

Subjects were told that psychologists have been studying memory by using laboratory materials for many years and that there has been relatively little research on autobiographical memory. They were also told that we would ask them about some memories, but we would not ask them to describe the memory in detail or to reveal anything personal. Subjects then received a packet of instructions and response sheets. The instructions in various conditions were as follows:

Social occasion: "Think of a recent social occasion—party, dinner, or a gathering of some sort that involved more than two people including yourself."

Visit to a library: "Think of a recent time you spent in a library."

Trip to dentist: "Think of a recent time you visited the dentist."

Dream: "Think of a recent dream—any dream you think you can remember fairly well."

Fantasy: "Think of a recent fantasy—that is, something you made up and imagined while you were awake—any fantasy you can remember fairly well."

Unfulfilled intention: "Think of a recent time you intended to do or thought about doing something, but then you never got around to doing it. It should be something you actually might have done but did not."

The instructions were modified appropriately for subjects asked to remember childhood events.

Subjects were given several minutes to think of each target memory. In these studies we were not concerned with how a particular cue leads to an event memory, that is, with the process of recollection itself (e.g., Baddeley, 1982). Retrieval time for a particular memory depends on the nature of the cue given (Reiser, Black, & Abelson, 1985; Robinson, 1976). For example, Reiser et al. found that subjects report memories more quickly for activity cues (e.g., eating at a restaurant) than for general action cues (e.g., paying). In our study, going to the library or the dentist (activity cues) should be particularly good retrieval cues, whereas a social occasion, dream, fantasy, and intention are more abstract and should take more time to cue a memory. Consistent with this expectation, 2 subjects in Study 2 were replaced because they failed to remember an unfulfilled intention within the time allowed; otherwise, subjects appeared to have enough time to remember an appropriate event.

After both memories had been identified, subjects rated their memories for each event by using the Memory Characteristics Questionnaire (MCQ) shown in the Appendix. The MCQ consists of questions assessing a wide range of memory characteristics (e.g., visual detail, complexity, spatial and temporal information, and feelings). For most of the items on the MCQ, the subject responds by checking a number on a 7-point scale (e.g., the relative spatial arrangement of objects in my memory for the event is: *vague* 1 2 3 4 5 6 7 *clear/distinct*).

Subjects were randomly assigned to pairs of different stimulus materials so that each of the three types of perceptual events occurred about equally often with the three types of imagined events. The order in which the questions were asked was counterbalanced. Any given subject remembered events from childhood or adulthood and the assignment of subjects to condition was random. Subjects were tested in groups of varying sizes.

Results

Subjects' estimates placed 85% of the recent memories within the last year. The average age at which childhood events occurred was 9.2 years. This question (#39) was not answered by 7 subjects for imagined events and 1 subject for perceived events, indicating subjects may have had more trouble dating imagined events than perceived ones. Such an effect is predicted by the Johnson–Raye (1981) reality monitoring framework (also see Johnson, Raye, Foley, & Kim, 1982).

Table 1 includes the mean memory ratings for each item in the MCQ. For each item the following planned comparisons were conducted: perceived versus imagined recent events, perceived versus imagined childhood events, recent versus childhood perceived events, and recent versus childhood imagined events. The outcomes of these comparisons are indicated in Table 1 and summarized in the next two sections.

Perceived versus imagined. As can be seen in Table 1, for recent events, perceived events were given higher ratings than imagined events on the following characteristics: visual detail, sound, smell, taste, realism, location, setting, spatial arrangement of objects and people, and temporal questions (time, year, season, day, and hour). Perceived events were also more positive in tone and included more supporting memories from before and after the target event. Recent imagined events were more complex than were recent perceived events, seemed at the time to have more implications, were more intense, and were thought about more often. For childhood events, the means were in the same direction on most of these items, but the perceived (P) versus imagined (I) comparisons were significant at the .05 level only for taste (P > I), realism (P > I), and year (P > I).

Recent versus childhood. As can also be seen in Table 1, for perceived events, recent events received higher ratings than did childhood events on visual detail, vividness, order of events, spatial arrangement of objects and people, temporal items (time, year, season, day, and hour), tone, overall memory, and supporting memories both before and after the event. For imagined events, recent memories were more realistic, had better information about the year and season, more

Table 1

Study 1: Mean Memory Ratings on Each Memory Characteristics Questionnaire Item

Item	Recent P		Recent I[a]	Childhood P		Childhood I[b]	Recent > childhood[c,d]
Clarity	5.50		5.06	5.06		4.50	
Color	5.61		5.25	5.06		4.56	
Visual detail	6.00	>	5.11	5.22		4.56	P
Sound	4.67	>	3.08	3.80		3.44	
Smell	3.03	>	1.81	2.25		1.92	
Touch	3.92		4.00	3.03		3.19	
Taste	3.14	>	1.56	2.50	>	1.33	
Vividness	5.69		5.06	4.97		4.78	P
Event detail	5.19		4.69	4.89		4.53	
Order of events	5.28		4.67	4.36		4.11	P
Complexity	2.36	<	3.42	2.80		3.31	
Realism	6.36	>	4.97	5.78	>	3.89	I
Location	6.58	>	5.53	6.17		5.81	
Setting	5.97	>	4.89	5.83		5.72	
Objects (spatial)	6.11	>	4.53	5.03		4.69	P
People (spatial)							P
Time	5.89	>	3.97	4.00		3.97	P
Year	6.64	>	4.92	4.08	>	3.28	P, I
Season	6.06	>	4.81	3.83		3.72	P, I
Day	4.75	>	2.92	2.61		2.11	P
Hour	5.14	>	2.86	3.17		3.00	P
Event duration	3.72		4.25	3.31		3.44	
Tone (−/+)	5.50	>	4.50	4.72		4.47	P
Participant	6.25		6.39	6.36		6.42	
Seeming implications	3.08	<	4.83	3.56		3.44	I
Actual implications	2.89		3.03	3.00		2.58	
Remembered feeling	6.06		5.53	5.53		5.17	
Felt (−/+)	4.61		4.83	4.30		4.50	
Felt intense	4.36	<	5.44	4.78		5.00	
Current intensity	3.67		3.61	3.17		2.83	
Remembered thoughts	4.86		5.08	4.56		4.22	
Self-revealing	4.58		4.67	4.39		4.36	I
Overall memory	5.86		5.25	4.92		4.86	P
Events before	4.72	>	3.06	2.72		2.47	P
Events after	4.86	>	3.08	3.11		2.50	P
Doubt/certainty	5.67		5.28	4.97		4.81	
Covert rehearsal	3.33	<	4.50	2.97		3.53	
Overt rehearsal	3.06		3.00	2.69		2.72	I

Note: P = perceived; I = imagined. The range of Fs(1, 70) and MS_es for significant comparisons ($p < .05$) are as follows: [a] For recent events, P versus I, Fs between 5.57 and 28.10, MS_es between 1.42 and 5.98; [b] for childhood events, P versus I, Fs between 4.27 and 15.85, MS_es between 2.74 and 4.05; [c] for perceived events, recent versus childhood, Fs between 4.23 and 40.53, MS_es between 1.78 and 5.85; [d] for imagined events, recent versus childhood, Fs between 3.85 and 9.20, MS_es between 2.97 and 5.54.

implications, higher ratings on remembered thoughts, and more covert rehearsal.

Discussion

In Study 1, perceived events were given higher ratings on questions assessing various perceptual characteristics and contextual information. In addition, subjects reported better memory for events preceding and following the target for perceived events than for imagined ones. In contrast, imagined events were more intense, less positive, less realistic, seemed to have more implications at the time, and were thought about more often. These effects were clearly significant for recent memories and were generally in the same direction, but weaker, for childhood memories. Such differences between perceived and imagined events could provide the basis for reality monitoring decisions (Johnson & Raye, 1981). In Study 2, we asked whether subjects in fact use such differences to make attributions about the origin of a memory.

Study 2

We asked subjects to remember one perceived event and one imagined event. Then we asked them to describe how they knew the event they had in mind actually happened (or happened only in their imagination). From the results of Study 1, we would expect subjects in Study 2 to use details of the target memory, supporting memories, and how realistic the event is to justify their beliefs about the origins of memories because memories of perceived and imagined events differ in these ways.

Method

As in Study 1, all subjects remembered one perceived event and one imagined event. Half of the subjects were asked to remember childhood experiences and the other half were asked to remember recent adult experiences. The subjects were 90 male and female undergraduates enrolled in introductory psychology courses at the State University of New York at Stony Brook. No subject participated in both Experiment 1 and Experiment 2. Subjects typically participated in groups of three.

The memories asked about and the counterbalancing procedure were the same as in Study 1. Instead of rating each memory on the MCQ, subjects answered a question about each memory. For perceived events the question was, "How do you know this event actually happened?" and for imagined events, "How do you know this event did not actually happen?" The experimenter encouraged subjects to write legibly and not to worry about grammar, spelling, or punctuation. Subjects had 5 min to answer each question and then were asked to estimate when the events they remembered had taken place.

Results

According to subjects' reports, about half of the recent memories were for events that happened within the last week, and all recent memories were estimated to have happened within the last few months. The average age at which remembered childhood events occurred was 9.0 years, and the reported ages of perceived and imagined memories did not differ.

Subjects' responses to the "how do you know" questions were divided into idea units. The mean number of idea units reported for recent and childhood memories were 2.02 and 1.98 for memories of perceived events, and 1.53 and 1.49 for imagined events. There were no significant differences among these conditions.

Responses were classified according to three major categories. First, subjects mentioned characteristics of the target memory itself, such as perceptual, temporal, or location information or their emotional responses ("I can remember what the dentist's office looked like"; "I remember how long this event took"; "I remember what time I went"; "I remember having strong feelings about the situation at the time"). Second, subjects mentioned supporting memories related to the target memory (e.g., physical evidence after a party, such as leftovers, bills, pounds gained, conversations in anticipation of or after the fact, planning). Third, subjects engaged in reasoning based on general knowledge or metamemory assumptions (e.g., "[this must be a fantasy because] I was too young to be a doctor"; "I think about it the same way every time. If I imagined it, it would be different every time I thought about it"; "How else could it be in memory [if it didn't really happen]?").

In the analyses that follow, we report findings for initial responses (first idea units reported) because these responses should best reflect differential accessibility of cues for origin decisions and because subjects who gave several reasons will not disproportionately affect the observed patterns. Table 2 summarizes the percentage of initial responses classified within each of these three general categories of responses (as well as the percentage of unclassified responses).

As is immediately evident from the data in Table 2, responses were quite different, depending on the origin of memory, χ^2 (3, N = 180) = 37.08, $p < .001$. (It should be noted that the frequencies were not independent because each subject contributed a memory for a perceived and an imagined event.) For perceived events, subjects mentioned information about the target memories themselves and supporting memories more often than they engaged in reasoning. For imagined events, there was a marked tendency to engage in reasoning instead of commenting on characteristics of the target memory. These data provide a clear demonstration of the importance of supporting memories in indicating events really happened and of the involvement of reasoning processes in identifying and evaluating memories for imagined events.

We also examined responses taking into account the age of the memory. The pattern of responses for imagined events did not differ for recent and childhood memories. For per-

Table 2
Study 2: Percentage of Initial Responses in Each Scoring Category

Type of response	Origin of event	
	Perceived	Imagined
Target memory	43	14
Supporting memory	38	21
Reasoning	19	56
Other (unclassified)	0	9

ceived events, the pattern was also generally similar for recent and childhood memories, although within the scoring category of target memory characteristics, people tended to mention sensory and contextual information somewhat more often for childhood memories and conversations and emotional reactions somewhat more frequently for recent memories. We cannot say, of course, whether this pattern reflects differences in the characteristics of memories established by children and adults or differences in the "durability" of different types of information. The issue of changes over time in various qualitative characteristics of memories is addressed more directly by Suengas and Johnson (1988, Experiment 3).

General Discussion

Compared with memories for recent imagined events, memories for recent perceived events included better temporal and spatial information and greater perceptual detail. In addition, memories for perceived events were more likely to give rise to memories for supporting information (Study 1). These are the sorts of characteristics of memories people mention in justifying the origin of a memory (Study 2). Overall, these findings regarding the salience in autobiographical memories of perceptual, contextual, and supporting information fit the general assumptions of the Johnson–Raye (1981) reality monitoring framework and provide evidence that findings from more controlled experiments on complex memories (Johnson & Suengas, in press; Suengas & Johnson, 1988) apply to natural contexts as well.

Finally, from Study 1 one might be tempted to conclude that sensory and contextual information is lost at a faster rate from memories for perceived events than from memories for imagined events (see recent vs. childhood comparisons in Table 1). But two findings argue against this conclusion. First, for these autobiographical memories, subjects reported that they had thought more often about the recent imagined events than about the perceived events. These data suggest that the imagined autobiographical events that are available for recall when subjects are asked to remember an imagined event have been frequently rehearsed (Neisser, 1982; Rubin & Kozin, 1984). If the particular perceived events that we selected were less likely to have been thought about since they happened, this could account for their apparently greater loss of information over time. Thus, in Study 1, the relatively flat forgetting functions for imagined events very likely underestimate the forgetting of imagined events. Second, and consistent with this conjecture, when Suengas and Johnson (1988, Experiment 3) compared loss of information over a 24-hr interval for perceived and imagined events with content held constant, certain types of information became unavailable more quickly for imagined than for perceived memories (also see Johnson et al., 1982).

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Appendix

Memory Characteristics Questionnaire

My memory for this event
1. is 1 = *dim*; 7 = *sharp/clear*
2. is 1 = *black and white*; 7 = *entirely color*
3. involves visual detail 1 = *little or none*; 7 = *a lot*
4. involves sound 1 = *little or none*; 7 = *a lot*
5. involves smell 1 = *little or none*; 7 = *a lot*
6. involves touch 1 = *little or none*; 7 = *a lot*
7. involves taste 1 = *little or none*; 7 = *a lot*
8. Overall vividness is 1 = *vague*; 7 = *very vivid*
9. My memory for the event is 1 = *sketchy*; 7 = *very detailed*
10. Order of events is 1 = *confusing*; 7 = *comprehensible*
11. Story line is 1 = *simple*; 7 = *complex*
12. Story line is 1 = *bizarre*; 7 = *realistic*
13. My memory for the location where the event takes place is 1 = *vague*; 7 = *clear/distinct*
14. General setting is 1 = *unfamiliar*; 7 = *familiar*
15. Relative spatial arrangement of objects in my memory for the event is 1 = *vague*; 7 = *clear/distinct*
16. Relative spatial arrangement of people in my memory for the event is 1 = *vague*; 7 = *clear/distinct*
17. My memory for the time when the event takes place is 1 = *vague*; 7 = *clear/distinct*
18. for the year is 1 = *vague*; 7 = *clear/distinct*
19. for the season is 1 = *vague*; 7 = *clear/distinct*
20. for the day is 1 = *vague*; 7 = *clear/distinct*
21. for the hour is 1 = *vague*; 7 = *clear/distinct*
22. The event seems 1 = *short*; 7 = *long*

23. The overall tone of the memory is 1 = *negative*; 7 = *positive*
24. In this event I was 1 = *a spectator*; 7 = *a participant*
25. At the time, the event seemed like it would have serious implications: 1 = *not at all*; 7 = *definitely*
26. Looking back, this event did have serious implications: 1 = *not at all*; 7 = *definitely*
27. I remember how I felt at the time when the event took place: 1 = *not at all*; 7 = *definitely*
28. Feelings at the time were 1 = *negative*; 7 = *positive*
29. were 1 = *not intense*; 7 = *very intense*
30. As I am remembering now, my feelings are 1 = *not intense*; 7 = *very intense*
31. I remember what I thought at the time: 1 = *not at all*; 7 = *clearly*
32. This memory reveals or says about me: 1 = *not much*; 7 = *a lot*
33. Overall, I remember this event: 1 = *hardly*; 7 = *very well*
34. I remember events relating to this memory that took place: in advance of the event: 1 = *not at all*; 7 = *yes, clearly*
35. after the event: 1 = *not at all*; 7 = *yes, clearly*
36. Do you have any doubts about the accuracy of your memory for this event? 1 = *a great deal of doubt*; 7 = *no doubt whatsoever*
37. Since it happened, I have thought about this event: 1 = *not at all*; 7 = *many times*
38. talked about it: 1 = *not at all*; 7 = *many times*
39. About when did this event happen? Circle one: just today   yesterday   few days ago   last week   few weeks ago   last month   few months ago   last year   longer (if childhood, indicate age)

Note. In Study 1, Items 15 and 16 were combined in one. In Suengas and Johnson (1988), reported analyses for Experiments 1–3 are based on Items 1–17, 22–24, and 27–36.