Social Cognition, Vol. 5, No. 3, 1987, pp. 238–258

THOUGHTS ABOUT ACTIONS: THE EFFECTS OF SPECIFICITY AND AVAILABILITY OF IMAGINED BEHAVIORAL SCRIPTS ON EXPECTATIONS ABOUT ONESELF AND OTHERS

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Past research has shown that simply imagining oneself deciding to perform or refusing to perform a target behavior produces corresponding changes in expectations about oneself, whereas imagining someone else has no impact on expectations about oneself (Anderson, 1983b). The present experiment further examined this specificity effect and the proposed underlying mechanism. It was hypothesized that imagining oneself in a behavioral script would influence expectations about oneself, but not expectations about another person, and that imagining another person in a behavioral script would influence expectations about that person's behavior, but not expectations about one's own behavior. Furthermore, it was hypothesized that previously imagined scripts would be easier to imagine (i.e., more available), and that ease of imagination would be correlated with behavioral expectations. All hypotheses were supported. The role of imagined scripts in a variety of decision domains is discussed.

Consider the following scenario: You are working in your office when you receive a telephone call requesting you to arrange an appointment to donate blood the following week. Later you receive a program announcement in the mail inviting grant applications in your general area of interest. Finally, you participate in a faculty meeting deciding the fate of a junior colleague who is being considered for tenure. How do you decide what to do in each case?

We thank Morgan Slusher, Constantine Sedikides, Lynn Arnoult, and Daniel M. Wegner for their helpful comments on earlier drafts of this article, and Scott Morris for his assistance in collecting these data. Requests for reprints should be sent to Craig A. Anderson, Department of Psychology, P.O. Box 1892, Rice University, Houston, TX 77251.

This question has prompted research in a variety of areas, resulting in utility models, attitude-affect models, persuasion models, and behavioral models, to name a few. Each captures some aspect of the underlying decision process for at least one of the previous examples. However, recent work in cognitive and social-cognitive psychology suggests that many such decisions are made through the use of simple judgmental heuristics (e.g., Nisbett & Ross, 1980). In particular, we propose that such decisions are often based on the availability (Tversky & Kahneman, 1973) of relevant behavioral scenarios (cf. Anderson, Lepper, & Ross, 1980) or scripts (Abelson, 1981). That is, the decision maker recruits or calls to mind similar scenarios, plays them through, and emits the relevant behavior or decision. Those scenarios or scripts that come to mind most easily will, all else being equal, most heavily influence the decision.

Indeed, everyday language reveals this process in decision making. Witness expressions such as "I can't imagine myself doing that," "Yes, I can see myself in that position," "It's hard to imagine him in that situation," "It is difficult to see how that could happen." Thus, to the extent that it is easy to see yourself donating blood, you will be more likely to make the appointment. To the extent that the grant program announcement leads you to think of scenarios ending in success, you will be more likely to decide to apply. To the extent that it is difficult to imagine your junior colleague doing important work, you will be cool toward promotion. That is, the results of such mental simulation processes are changes in personal intentions, judgments about others, and corresponding actions.

Of course, factors other than script availability will influence these decisions. The expected consequences of a given behavior will certainly have a major impact on intentions to act. For example, if your easily available script for blood donation includes not only agreeing to donate but also getting AIDS (a commonly held but unfounded view), then you will decide not to do so. Attitudes, cost-benefit analyses, behavioral tendencies, and other factors undoubtedly play a role in the final decisions on some occasions. But recent evidence suggests that script availability also plays a major role. The most directly relevant work concerns the effects of imagining or thinking about events on the judged likelihood of the event.

IMAGINING SIMPLE EVENTS

A number of researchers have shown that imagining events increases the perceived likelihood of the events. However, not all such studies

address the notion of *script* availability. Making an *event* available, such as having certain easy-to-imagine medical symptoms, may increase the judged likelihood of contracting a disease defined by those symptoms (S. J. Sherman, Cialdini, Schwartzman, & Reynolds, 1985). But scripts refer to meaningful *sequences of events* that lead to the final scene or outcome event.

Obviously, a particular event (e.g., donating blood) can be further segmented into smaller and smaller units (e.g., rolling up a sleeve, having the needle inserted, clenching a fist, and so on). Thus, our distinction between events and scripts may seem an arbitrary one concerning level of descriptive detail. But the distinction concerns more than level. We regard scripts as sequences of events that are easily and naturally segmented (Newtson, 1976). We regard events as units that can be further segmented only by producing breakpoints that would seem artificial or unnecessarily detailed in the normal course of social observation.

One further difference between events and scripts may help clarify our position. Events correspond to behavioral descriptions, whereas scripts are usually explanatory, meaningful, ordered sequences. Early elements in scripts allow or cause later ones, and often contain the intentions or goals of an actor (cf. Newtson, 1976; Read, 1987). In this sense, our distinction between events and scripts is similar to Wegner and Vallacher's (this issue) distinction between behavior and action. Behaviors (i.e., events) are *described*, whereas actions (i.e., scripts) are *understood*. The understanding takes place in the context of meaningfully related sequences of events.

The point of this discussion is that many studies of script manipulations are hard to interpret because the script manipulations have been confounded with event manipulations. For example, in Gregory, Cialdini, and Carpenter's (1982) Experiment 1, script subjects imagined themselves in scenarios ending in their arrest for armed robbery. Control subjects did not imagine anything regarding armed robbery. The obtained difference in judged likelihood of being arrested for armed robbery could have resulted from script availability (i.e., the imagined sequence of events leading up to arrest) or from event availability (i.e., thinking about arrest for armed robbery).

Either of two different control procedures may be used to eliminate this interpretational ambiguity. One might include a group that imagines only the target event (e.g., "Think about arrest for armed robbery"). Or one could include a group that imagines the same basic script, but with a central feature of the script (e.g., the main character) changed. In both of these "control" conditions, the target event (arrest for armed robbery) is imagined. Therefore, event availability is

increased in the control as well as in the script manipulation conditions. However, if subjects are making their decisions on the basis of script availability, only the script manipulation condition (with the proper main character) should yield elevated judgments.

In sum, studies in which a simple event is imagined do address the notion that people frequently use some availability heuristic in judging likelihood. But these studies are not directly relevant to the script availability hypotheses under consideration. Furthermore, this *event* availability effect leads to interpretational difficulties in several studies that have manipulated *script* (or scenario) availability. Such interpretation problems exist in most studies in this area (e.g., Gregory, Cialdini, & Carpenter, 1982, Experiments 1, 2, and 3; Wilson & Capitman, 1982).[1]

IMAGINING SCRIPTS

Several researchers have explicitly induced subjects to think about various scenarios, and have assessed the effects on behavior, behavioral expectations, and social theories. For example, Anderson and colleagues (Anderson, 1982, 1983a; Anderson, New, & Speer, 1985; Anderson & Sechler, 1986) induced people to think about how and why certain variables in the social environment are causally related. Results indicated that subjects' beliefs (i.e., their social theories) were strongly influenced by the availability of causal arguments relating the variables. That is, manipulations designed to cause subjects to think about a particular social theory in a particular way produced corresponding changes in social theories. (See also Lord, Lepper, & Preston, 1984.) In one such experiment, subjects were led to imagine and explain how or why children abused by their parents fare better (or worse) when reintegrated into the family than when removed permanently from the family. Subjects led to imagine and explain the positive outcomes of reintegration tended to believe in that social theory, whereas subjects induced to imagine and explain the opposite relation came to hold the opposite theory (Anderson & Sechler, 1986). But these studies did not explicitly manipulate, nor did they assess, *script* availability. Therefore they do not unambiguously support the script imagination interpretation.

1. Note that these studies were not intended to test this distinction between event and script availability; rather, they were designed primarily to show that imagination effects do occur in these various contexts. Note also that Gregory *et al.* (1982) did recognize this distinction and addressed it in their fourth experiment.

Behavioral changes as a function of script imagination manipulations have also been documented, though in each case a strict script imagination interpretation is problematic. For example, Gregory *et al.* (1982, Experiment 4) showed that having potential cable TV subscribers imagine themselves subscribing to and enjoying the benefits of cable TV increased subscription rates. However, their manipulation also produced attitude changes that wholly accounted for the behavioral differences between the experimental groups (see the discussion of this by Anderson, 1983b). Wright (1979) showed that having people observe a TV advertisement advocating and modeling the reading of warning labels before buying various products increased the likelihood of their actually reading warning labels. But subjects were not explicitly instructed to imagine themselves doing this behavior; therefore a script imagination interpretation is again problematic. Finally, R. T. Sherman and Anderson (1987) attempted to reduce psychotherapy dropout rates at an outpatient clinic with a script imagination procedure administered at the intake session. Those clients assigned to imagine themselves returning for at least four sessions were significantly less likely to drop out than those who simply had been informed that they should attend four sessions. In addition, behavioral expectation measures showed the hypothesized effects. But the experimental manipulation actually consisted of two parts: Subjects imagined and explained (hypothetically) returning for four sessions. The observed effects could have resulted from either the script imagination or the hypothetical explanation task.

The clearest support for the hypothesis that imagining a behavioral script can, via relative availability, influence a person's decisions or judgments comes from a pair of studies by Anderson (1983b). Subjects imagined and drew cartoon sketches of randomly assigned behavioral scripts. Personal expectations regarding the target behaviors in the scripts were assessed both before and after the cartoon task. In addition, attitudes toward the target behaviors were assessed. The variety of manipulations allowed a number of tests of script availability hypotheses, all of which were supported. Briefly, the results confirmed that (1) imagining oneself performing a given behavioral script can lead to increased expectations that one will perform the target behavior; (2) imagining oneself refusing to perform a given behavioral script can lead to decreased expectations that one will perform the target behavior; (3) increasing the frequency of script imagination can increase the effects; (4) imagining behavioral scripts with other people as the main character, rather than oneself, produces little or no effect on expectations about oneself; (5) these imagination effects can occur

in the absence of changes in attitudes toward the target behaviors; (6) the effects persist for at least several days.

ASSESSING SCRIPT EFFECTS

Overall, the studies on imagination effects strongly suggest that the availability of behavioral scripts influences decisions and judgments. Furthermore, we believe that such effects occur only when central features of the target judgments are included in the script manipulations. Although it is not always clear which features of a script are central, certainly the main character of a script is one such feature. Indeed, scripts are built around the actions, intentions, and goals of the main character. Thus, both past data and current theorizing about scripts suggest that manipulations of script availability will have specific and important effects on decisions, judgment, and actions.

However, past research has frequently lacked several key methodological features necessary for unambiguous interpretation. One important feature is to distinguish between manipulations of imagination of simple events and complex scripts. One must manipulate the imagination of scripts, and control for simple event availability. The imagination of scripts can be accomplished by instructing subjects to imagine sequences of events that lead up to the target behavior. It is also advantageous to assess what was imagined, either by having subjects write it down (e.g., R. T. Sherman & Anderson, 1987) or sketch it out (e.g., Anderson, 1983b). Controlling for simple event availability can be accomplished by presenting the control groups with equivalent information about the target event (e.g., Gregory *et al.*, 1982, Experiment 4; R. T. Sherman & Anderson, 1987), or by changing various script features, such as who is the main character, in a way that leads to different predictions for the different groups even though the target event is made equally salient (e.g., Anderson, 1983b).

A second key feature is to control for attitude or affect-induced changes. Because such changes are irrelevant to the script theory under consideration, they must be eliminated or otherwise controlled. One can minimize attitude changes by creating script manipulations that are unrelated to affective reactions to the target behavior. Basically, one should avoid manipulations that induce subjects to think about the positive or negative consequences of the target behavior. In addition, one should assess such affective changes and control them statistically when necessary (Anderson, 1983b; Wilson & Capitman, 1982).

A third feature is to manipulate variables that the script theory suggests should be influential, such as frequency of imagination, and relevance of the imagined scripts to the target behavior (e.g., Anderson, 1983b; R. T. Sherman & Anderson, 1987).

A final feature is to assess the proposed mediating variable and to relate it to the judgment or behavior under study. None of the studies to date has done so for behavioral scripts, though S. J. Sherman *et al.* (1985) did so for simple events and Anderson *et al.* (1985) did so for social theories.

The failure to assess directly the role of script availability is a major shortcoming in this line of work. The other key features are all contained in the cartoon paradigm of Anderson (1983b), which suggests that the availability issued be tested in that paradigm. However, the specificity of script availability effects deserves further attention as well. Recall that Anderson (1983b) found that imagining other people as main characters in the behavioral scripts had little or no impact on expectations about oneself. People appear to access very specific scripts when making availability-based judgments. This *specificity* hypothesis further suggests that self-relevant scripts will have little impact on judgments about others, and that other relevant scripts will have considerable impact on judgments concerning that specific other person. In a sense, Anderson (1983b) tested only a portion of the specificity hypothesis. The present experiment was designed to test both the specificity and the script availability hypotheses.

METHOD

OVERVIEW

The cartoon paradigm developed by Anderson (1983b) was modified to allow more precise tests of the specificity and availability hypotheses. Subjects imagined and sketched behavioral scripts that varied in the main character (self or a specific other), the outcome (the main character decides to do the target behavior or refuses to do it), and target behavior (donating blood, taking a new part-time job, tutoring someone, or taking a vacation trip). These same behaviors have been used in previous studies (Anderson, 1983b) and were selected because college students on the whole have no strong inclinations either to perform or not to perform them.

Measures of behavioral expectations for self and other, perceived consequences of the behaviors, and availability of the scripts were

gathered to test the following four hypotheses. First, the imagination task was expected to produce corresponding changes in expectations when the main character in the script was the same as the person for whom expectations were assessed. That is, imagining oneself in a script should influence expectations about the self but not about the other, whereas imagining a specific other in a script should influence expectations about the other but not about the self. This is one aspect of the specificity hypothesis.

Second, scripts previously imagined (and sketched) should be easier to imagine (i.e., more available) than scripts not previously imagined. This effect was expected whether the script for which availability was being assessed differed from the previously imagined scripts by only one central feature (e.g., main character or decision regarding the target behavior) or by both of these central features.

Third, script availability measures should be systematically related to behavioral expectations. Those scripts that were most available should have the most impact on expectations.

Fourth, the above-described effects should occur in the absence of attitudinal changes, as reflected by the measures of perceived consequences.

SUBJECTS

A total of 120 Rice University undergraduates participated in the study in groups of 2 to 8, and earned extra course credit. Subjects were thoroughly debriefed at the conclusion of their session.

PROCEDURE

Manipulations of Independent Variables

Subjects were told that the study concerned creativity in imagination processes. Their task was to sketch cartoon panels illustrating the four different action sequences (scripts) and to make several different ratings at various times concerning the activities illustrated in their cartoons. They were to imagine and sketch themselves as the main character in some of the scripts and a friend as the main character in the remaining scripts.

Creativity was emphasized, not drawing skills. Subjects were asked to spend no more than 3 or 4 minutes drawing each cartoon.

They were directed to make their ratings as accurate as possible for each scale and were told that ratings might change or stay the same from one scale to the next. At the end of the instruction period they were told to choose a specific friend for use in those scripts and rating scales that called for one, and to use that same friend for all such scripts and rating scales.

Subjects were given booklets containing the instructions, the rating scales, and the eight blank five-panel cartoon strips. Each of four scripts (one per target behavior) was to be imagined and drawn twice. Subjects imagined themselves as the main character for two of the scripts, and the specified friend for the other two. Crossing this manipulation of the main character was one of script outcome. Two of the scripts had the main character deciding to do the target behavior; the other two had the main character deciding not to do the target behavior.

A counterbalancing procedure was devised to insure that various combinations of scripts, main character, and outcome were equally represented. For a given behavior, half the subjects sketched a positive outcome and the other half a negative one. Also, half sketched themselves as the main character, and the other half sketched a friend.

A Latin square was used to create four between-subjects conditions varying which target behavior was in which of the four possible main character × script outcome conditions, such that each behavior was equally represented in each condition. Similarly, four orders of target behaviors were created as another between-subjects factor, with each behavior appearing in each position in the booklet an equal number of times. Because neither of these two counterbalancing factors had any significant or meaningful effects, they are not discussed further here, though they were retained in all analyses.

Assessment of Dependent Variables

Subjects indicated various expectations and opinions by marking rating scales. They circled a mark on a 16-point scale both before and after sketching their cartoons to indicate how likely they and their specifically targeted friends were to perform each of the four behaviors. The scales were anchored at "definitely will not begin (tutoring)" (assigned a score of 1) and "definitely will begin (tutoring)" (assigned a score of 16).

Both before and after the cartoon manipulation, subjects also rated the consequences of performing each behavior. These scales were verbally anchored at "The consequences of (tutoring) are all negative" (assigned a score of 1), " . . . are equally positive and negative," and

" . . . are all positive" (assigned a score of 16). These ratings were gathered to assess whether observed expectation changes could be explained by changes in feelings about the target behavior.

Additional ratings were made after the imagination–cartoon task, to assess the availability of all the various scripts used in this experiment. Each of the 8 scripts (4 target behaviors × 2 outcomes) was imagined and rated for ease twice, once with the subject and once with the friend as the main character. Ease-of-imagination ratings were anchored at "very easy" (9) and "very difficult" (0). Note that for each subject, 4 of these 16 scripts had been imagined previously.

Finally, subjects rated the plausibility of the various scripts they had imagined in the cartoon manipulation. These ratings yielded nothing of interest and are not discussed further here.

Debriefing

All subjects received a thorough written debriefing. It explained the procedures and the theoretical rationale of the study, as well as its relevance to the participants.

RESULTS AND DISCUSSION

BEHAVIORAL EXPECTATIONS

Changes in behavioral expectations were assessed by subtracting precartoon ratings from corresponding postcartoon ratings. Thus, positive scores indicated an increase in the judged likelihood of the main character's doing the target behavior, whereas negative scores indicated a decreased expectancy.

On the basis of the specificity hypothesis, we predicted that expectations would change in a positive direction when the main character was imagined doing the target behavior, and in a negative direction when the main character was imagined not doing the target behavior, but only when the main character in the cartoon task was the same as the main character in the expectation rating task. Statistically, this was the three-way interaction among cartoon main character (self or other), cartoon outcome (doing or not doing the target behavior), and expectation rating target (self or other). This interaction was significant $F(1, 41) = 8.75$, $p < .01$. Figure 1 presents these results, reorganized as a two-way interaction between main character congruence and cartoon outcome. As can be seen in Figure 1, the cartoon

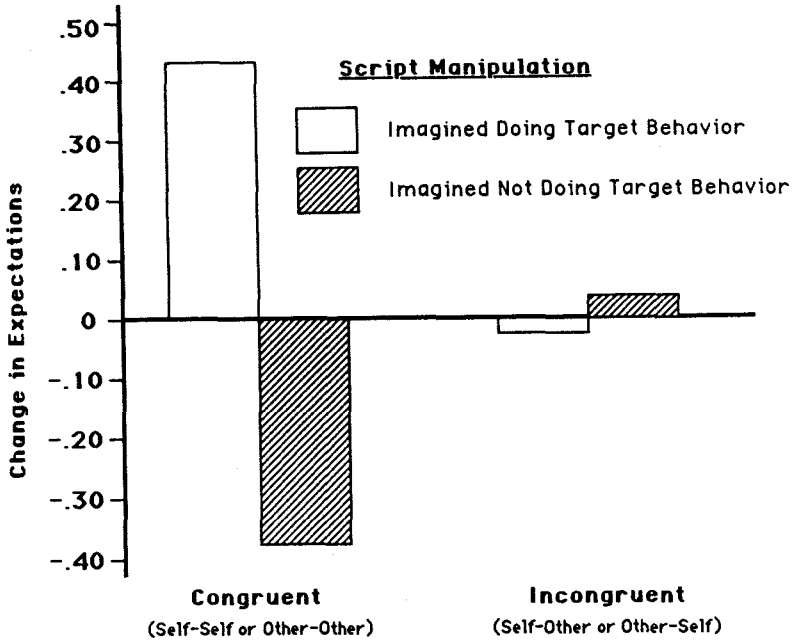


FIGURE 1
Changes in expectations resulting from the script manipulation: The congruency effect.

outcome manipulation had a strong effect in the congruent conditions, but not in the incongruent conditions.[2]

Furthermore, within the congruent conditions, each type of expectation (self vs. other) was reliably influenced by its respective congruent imagination manipulation (p's $< .05$). That is, expectations about the self were significantly influenced by the script manipulations that included the self as the main character; other expectations were significantly influenced by the script manipulations that included the other as the main character.

These results support both the specificity and the script availability hypotheses. Changes in behavioral expectations resulted from imagination processes, apparently by increasing the availability of the

2. There was no difference between the size of the self and other specificity effects in either the congruent or the incongruent conditions (F's < 1). This makes possible the breakdown presented in Figure 1.

specific script imagined. The results also rule out a simple event availability interpretation, for the same events were made available in both the congruent and incongruent conditions. But systematic changes in expectations occurred only when scripts congruent with the rating task had been imagined.

PERCEIVED CONSEQUENCES

Subjects rated the consequences of performing each behavior, both before and after drawing the cartoons. Consequence change scores were calculated in the same manner as were the expectation change scores by subtracting the pre- from the postmanipulation consequence ratings. This was done to test our assumption that the cartoon task affected expectations but not attitudes toward the target behaviors. Obviously, some imagination manipulations will influence attitudes (e.g., Gregory *et al.*, 1982). Obtaining the predicted expectancy change effects in the absence of attitudinal changes, though, would strengthen our claim that a purely cognitive script availability mechanism was at work in the present study. As intended, the consequence ratings were unaffected by the outcome in the imagination-cartoon task (F's < 1). The main effect of script main character was significant, $F\ (1, 41) = 4.56$, $p < .05$ (M's $= -.40$ and $.13$ for the self and other conditions). In the absence of script outcome effects, this main character effect is irrelevant to the interpretation of the expectancy effects described earlier. In essence, the lack of script outcome effects on perceived consequences further strengthens the availability hypothesis, in that it tests and fails to support the alternative explanation that expectation ratings changed because of a change in attitude or affect related to the target behaviors.

We are not claiming that there is no relation between expectations and perceived consequences. These two dependent measures would be suspect in this study if they showed no relation. A variety of supplementary analyses relating expectancies to perceived consequences all yielded significant correlations; the average r was .33 ($p < .02$). However, the fact that the imagination outcome manipulation influenced expectations but not perceived consequences eliminated perceived consequences as a potential mediator of the expectancy changes.

AVAILABILITY

After completing the cartoon task, the expectation ratings, and the perceived consequence ratings, subjects rated how easily it was to

imagine both themselves and their friends doing and not doing each target behavior. If the cartoon task leads to the creation of easily available yet specific scripts, then at a later time subjects should find it easier to imagine scripts that are congruent with what they previously imagined (and sketched) than those that are incongruent in some way (i.e., different main character or outcome). As expected, subjects found it easier to imagine congruent scripts ($M=6.53$) than incongruent scripts ($M=6.07$), $F(1, 41)=7.91$, $p<.01$. That is, having thought about a particular action sequence once, with a particular main character and outcome, made it easier to think of later. This result further supports our contention that script availability drives the imagination-expectation change process.

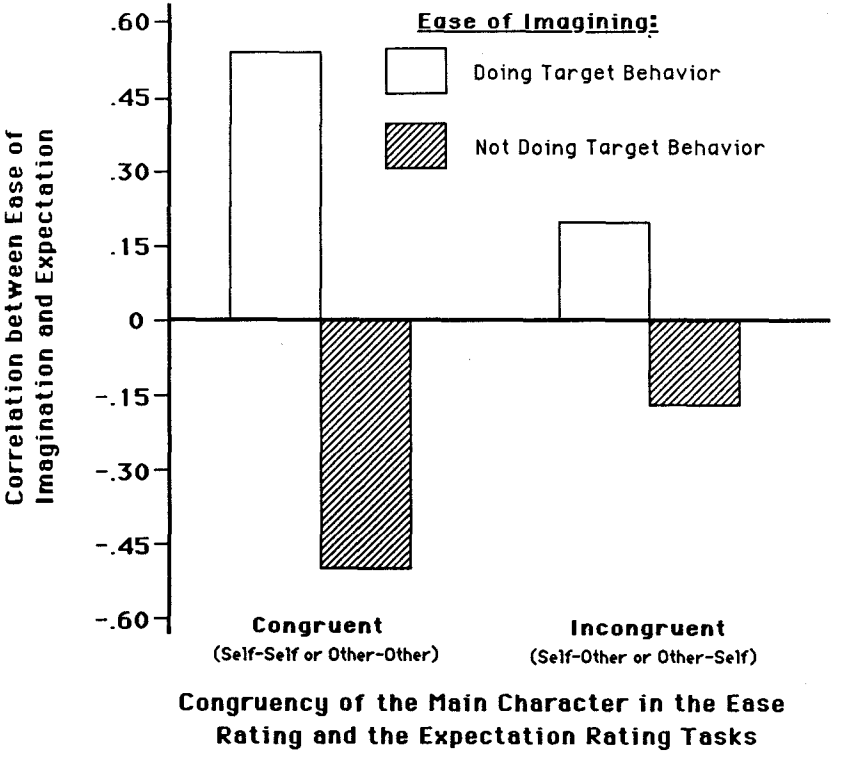
AVAILABILITY AS A MEDIATOR

To examine this availability-expectation link further, a rather complex correlation analysis was performed. For each target behavior, the overall design incorporates five factors: cartoon main character (self or other), cartoon outcome (doing or not doing the target behavior), expectation rating main character (self or other), ease rating main character (self or other), and ease rating outcome (doing or not doing the target behavior). For each of the 32 cells created by these factors, we computed a correlation between ease of imagining a script and behavioral expectancy (postcartoon). This was done for each of the four target behaviors. If script availability is a mediator of behavioral expectancies, as proposed, then these correlations should be positive when the ease rating was done on a positive script and negative when done on a negative script. That is, the easier it is to imagine someone doing a given behavior, the greater our expectancy that he or she will do it; the easier it is to imagine someone refusing to do a given behavior, the lower our expectancy that he or she will do it. Of course, this effect should be strongest when the main character is the same person in the ease ratings and the expectation ratings being correlated. For example, the ease of imagining oneself donating blood should have a stronger effect on expectations about oneself than on expectations about the other, and vice versa.

A five-way within-subjects analysis of variance (ANOVA) was conducted on these correlations, with the four target behaviors serving as replications of a random variable. This conservative procedure results in an error term with only three degrees of freedom. We felt this to be appropriate, because of the necessarily complex interdependencies in the correlations. The prediction outlined above is statistically a three-way interaction of behavioral expectation rating main character, ease rating main character, and ease rating outcome. Conceptually, it can be reduced to the two-way interaction between main character congruency and ease rating script outcome, as shown in Figure 2.

The ANOVA yielded two highly significant effects. First, the expectation ratings were positively correlated with ease ratings for positive-outcome scripts and negatively correlated with ease ratings for negative-outcome scripts, $F(1, 3)=130.08$, $p<.002$. More critically, this difference was much larger when the main characters in the ease and expectancy rating tasks were the same than when they were different, $F(1, 3)=73.16$, $p<.005$. This latter result supports both the availability and the specificity hypotheses. Behavioral expectations

FIGURE 2
Script availability-expectation correlations: The congruency effect.



were, as predicted, closely related to the availability of very specific scripts.[3]

CONCLUSIONS

At a theoretical level, these results support two main conclusions. First, script availability is a crucial mediator of script imagination effects. Thinking about a particular sequence of events leading up to some target behavior makes it easier to imagine that script at a later time. In turn, the ease of imagining a particular script apparently is used in judging how likely the outcome of that script is to occur. This conclusion supports much past speculation about the process underlying such judgments, and nicely complements similar conclusions offered by S. J. Sherman *et al.* (1985) on availability of simple events and by Anderson *et al.* (1985) on availability effects on social theories. In sum, it appears that across a wide range of situations and thought manipulations, changes in the availability of thoughts create corresponding changes in judgments, decisions, beliefs, intentions, and actions.

A second theoretical conclusion supported by the present data is that people access and use very specific scripts when assessing behavioral expectancies. When either of the two central features of the imagination-cartoon script (i.e., main character or outcome) were different from those of the to-be-judged script (behavioral expectation or ease-of-imagination tasks), the imagination manipulation had little or no effect. That is, the specificity hypothesis was strongly supported in all analyses.

RELATED THEORETICAL POSITIONS

The theoretical conceptualization presented in this article is compatible with several other recent perspectives. Three seem particularly relevant.

First, Anderson *et al.* (1980) proposed that people often construct and access specific behavioral scenarios when trying to understand and predict events in the social environment. Kahneman and Tversky (1982) developed and refined this same idea, and labeled it the "simulation heuristic." The imagination-expectation process described in

3. An *r*-to-*z* transformation performed on these data had no appreciable effect on the analyses.

this article essentially revolves around the construction of mental simulations of events, and the later recruitment of these scripted simulations. When expectations were assessed, those scripts that easily came to mind influenced subjects' judgments. That is, simulations (scripts) that had already been constructed and rehearsed were most available and had the most impact. Simulations that had to be newly constructed at the time of judgment were less available, and thus seemed less likely models of the situation.

The second related theoretical perspective is the Markus and Nurius (1986) notion of "possible selves." Briefly, Markus and Nurius have proposed that people carry around conceptions of what they might be, in addition to beliefs about what they are. These possible selves are seen as motivators, as the individual essentially creates (and attempts to follow) scripts that lead toward desired possible selves or lead away from undesired possible selves. Obviously, the link from a possible self to carrying out action to become (or avoid becoming) that self requires some type of script generation process. We propose that the imagination process outlined here (and the simulation process mentioned above) provides this link.

The third related perspective is action identification theory (Vallacher & Wegner, 1985, 1987). A key aspect of the theory concerns the malleability of low-level action identifications, which specify how an action is performed. Actions identified at such a low level are seen as being particularly susceptible to changes in meaning or higher-level identities. Various contextual or situational cues may essentially shift the meaning of the action, such that the actor understands the action in a different way. In the present study, the cartoon task may be seen as creating a new action identity. The task requires that subjects think in turn about a variety of low-level details as they sketch a sequence of subactions. The task simultaneously provides contextual cues defining the action at a higher level, in terms of the subjects' expectations about the target person. Indeed, the frequency effect, in which multiple sketching of a particular script increased the effect size (Anderson, 1983b), may be an indication of a shift from a low-level identity (e.g., rolling up a sleeve) to a higher one (e.g., donating blood). In essence, reviewing the lower-level details of an act (in Vallacher and Wegner's terms) may yield commitment to the act's higher-level meaning.

RANGE AND APPLICABILITY OF SCRIPT EFFECTS

The script availability theory of thought and action has many obvious applications. In a clinical context, one should be able to produce de-

sired behavioral changes as well as thought and affect changes by having clients cognitively rehearse adaptive scripts (Arnoult & Anderson, 1987). Adaptive scripts may involve performing the desired behavior (e.g., R. T. Sherman & Anderson, in press) or may be targeted at producing changes in maladaptive thoughts (e.g., changing a maladaptive attributional style; see Anderson & Arnoult, 1985).

Imagination manipulations should be useful in improving a variety of work-related behaviors in schools, offices, and assembly lines. For instance, training people to use hazardous materials or equipment safely may be more effective if scenarios depicting correct usage are imagined (cf. Wright, 1979). A less direct but equally promising approach would attempt to change risk perceptions by having people imagine relevant accident and injury scenarios. The resulting elevation of risk perception may in turn reduce the inappropriate behaviors depicted as leading to harm.

Motivation may be maintained at a high level even in tasks that guarantee occasional failure by making salient a script involving a target person overcoming initial failures by learning from them and improving performance (cf. Dweck & Goetz, 1978; Sujan, 1986). For instance, getting people to think of tasks in strategy terms effectively insulates people from the typical maladaptive motivational consequences of failure (Anderson & Jennings, 1980; Anderson, Jennings, & Arnoult, 1987; Clifford, 1986a, 1986b).

Finally, in a variety of decision contexts, including legal, clinical, business, and political contexts, availability of particular scripts or scenarios may lead to unwarranted optimism in one's plans, in one's understanding of a situation, or in one's predictive powers (see Anderson *et al.*, 1985; Arnoult & Anderson, in press; Gilovich, 1981; Pennington & Hastie, 1986). Thus, a decision process strategy of imagining many possible scripts with varying outcomes may lead to more realistic views of the situation and to better decisions.

FUTURE RESEARCH

At least four distinct directions for future research are apparent. First, the utility of debiasing procedures that incorporate imagination tasks needs to be assessed in a variety of application domains.

Second, the boundary conditions of script imagination effects need to be discovered. We have used target behaviors that are fairly easy to imagine and easy to carry out. We have done so because we believe that imagination effects will be weaker (or nonexistent) for very difficult ones. It seems unlikely that imagining oneself defeating

hordes of "godless Communists" will change one's expectations or intentions to attack (though recent political and social events suggest that it may increase one's willingness to send others to attack). But what variables determine the magnitude of script imagination effects on various types of judgments and behaviors? A related set of questions concerns the time duration of these effects. What variables influence the persistence of script imagination effects?

There are also boundary condition questions regarding the script manipulation itself. Past studies, including the one reported in this article, have had subjects generate scripts themselves. That is, the imagination task typically requires subjects to generate the to-be-imagined script. Does active generation (as opposed to imagining preconstructed scripts) increase or decrease the imagination effect? Our suspicion is that the answer will require more complex analysis. We believe that active generation will either increase or have no additional effect (beyond imagination) when the imagination task is a relatively simple one. However, in many cases people will not be able to generate the target scripts easily, perhaps because of a lack of knowledge of the domain. For instance, someone who is not familiar with the workings of water treatment plants may find it difficult to imagine accidents resulting in water supply contamination. Such difficult-to-imagine script manipulations may result in no change in expectations, or may actually backfire, lowering people's estimates of the likelihood of water contamination (cf. S. J. Sherman *et al.*, 1985). Providing people with a preconstructed script in such cases may enhance the imagination effect. Indeed, we suspect that in cases where the target script is hard to imagine, provision of even weak, illogical, or flawed scripts to imagine will produce or increase an imagination effect.

A third set of interrelated questions concerns script recruitment and use. What determines which scripts will be brought to mind? Is the initial scene in the script most important in determining its accessibility and applicability for a given situation? The specificity effects reported in this article suggest that some features of a script are more central to its recruitment and use than others. For instance, script recruitment seems to be restricted to only those scripts that include the target person. Thus, although we believe that all the features of the judgment situation contribute to the recruitment process, we also believe that some script features are more central than others in recruiting scripts and judging their applicability to the decision task at hand. This notion is similar to the findings in the prototype literature that some features are more central than others in judging category membership in domains as diverse as object categorization (e.g., Rosch

& Mervis, 1975) and psychiatric diagnosis (Cantor, Smith, French, & Mezzich, 1980). Indeed, this is the crux of our specificity hypothesis: Only scripts whose central features (i.e., target person and target task) match the judgment task will be used in making that judgment. One major implication of this hypothesis, to be examined in future work, is that one can best counteract script-based judgment effects by inducing people to create "counterscripts" in which the same central target person and target task are imagined but different behavioral actions are chosen. This procedure is analogous to the counterexplanation procedure shown to be so effective in eliminating explanation-based biases in social theories (Anderson & Sechler, 1986).

The fourth set of issues concerns the links between script activation and enactment of behaviors depicted in the scripts. This, of course, is a variant of the more general question of how thoughts guide behavior. At this point, we must be content to rely on others' theories of actions, plans, and goals, such as action identification theory (Vallacher & Wegner, 1985, 1987), earlier script models (Schank & Abelson, 1977), and other cognitive models (e.g., Markus & Nurius, 1986; Miller, Galanter, & Pribram, 1960). However, considerably more work is needed to specify how thought guides action.

Answers to these basic theoretical questions will certainly lead to more effective applications of cognitive intervention strategies. But we feel that such applications can be usefully designed now, without waiting for more basic research. More importantly, we believe that the application research suggested above will provide answers to many of the remaining theoretical questions.

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