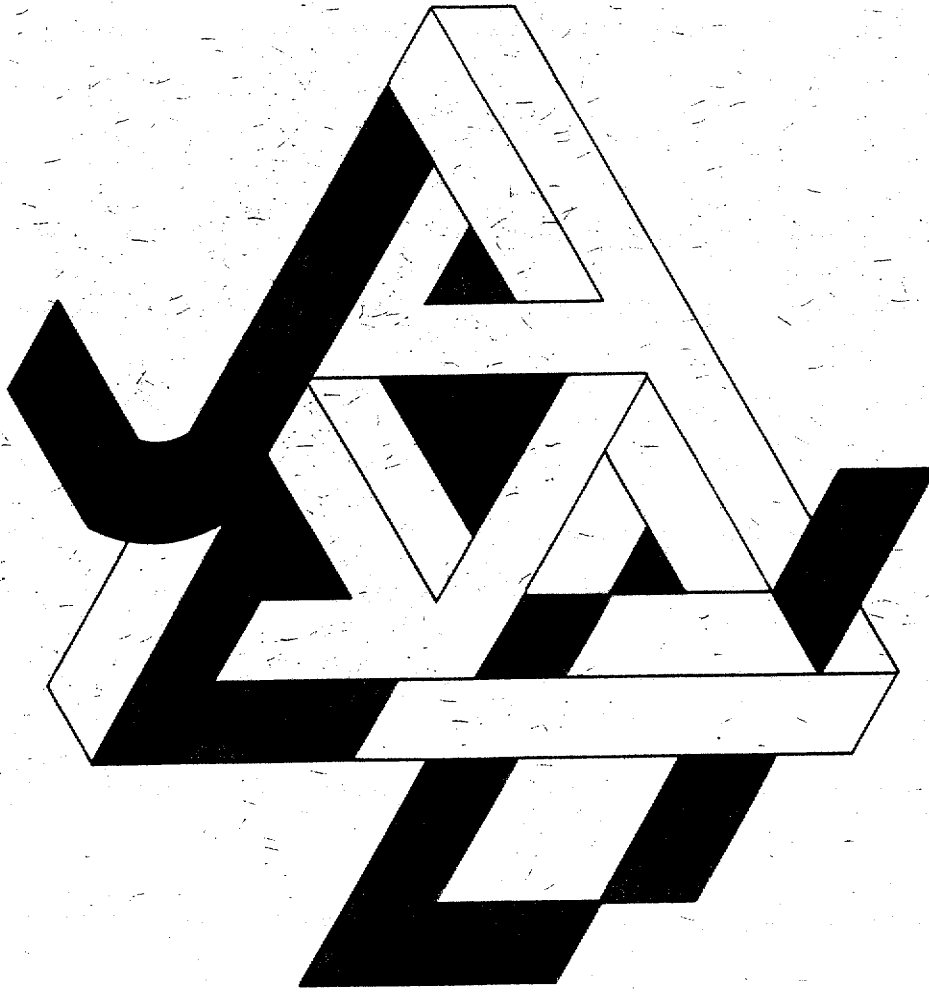


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Comment on Article by Professor Wohlmuth

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Fuzzy-Trace Theory Applied to the  
Theory and Practice of Law

In the current paper, Wohlmuth presents an overview of psychological research and its relevance to the law. In particular, Wohlmuth refers to recent research on fuzzy-trace theory, including children's suggestibility, effects of questioning on memory distortion, memory for events after long delays, and related topics. However, he extends the application of fuzzy-trace theory more broadly to such issues as driving regulations, commercial transactions, constitutional law, and international law. Although Wohlmuth exhibits a vast command of extant psychological and legal research, his major contribution in this essay is in breaking new theoretical ground, especially regarding the interaction between explicit and nonexplicit forms of representation, so-called verbatim and gist memories.

At first blush, Wohlmuth's essay appears to contradict a basic tenet of fuzzy-trace theory, namely, that verbatim and gist memories are independent.<sup>1</sup> That is, according to fuzzy-trace theory, people encode, store, and retrieve separate verbatim and gist memories of their experience. For example, witnesses to an automobile accident store verbatim memories that accurately represent the facts of the accident, but they also store gist memories of that experience that are potentially tainted by inference and interpretation.<sup>2</sup> Unfortunately, verbatim memories tend to become rapidly inaccessible, and their rigidity and vulnerability to interference apparently contribute to the predominant use of gist representations in reasoning and decision making.<sup>3</sup> Thus, psychological research on fuzzy-trace theory has emphasized differences between verbatim and gist memories, and their use in distinct tasks and contexts.

In contrast, Wohlmuth attends to the relatively neglected problem of the relation between verbatim and gist memories across related cognitive tasks, and explores the implication of these alternative forms of representation for both practical and theoretical aspects of the law. Wohlmuth shows that, as reasoners move from task to task, verbatim and gist representations

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1. For a summary of fuzzy-trace theory, see Valerie F. Reyna & Charles J. Brainerd, *Fuzzy-trace Theory: An Interim Synthesis*, 7 LEARNING AND INDIVIDUAL DIFFERENCES 1 (1995).

2. See Valerie F. Reyna, *Fuzzy-trace Theory and False Memory*, in CHALLENGES & CONTROVERSIES: MEMORY DISTORTIONS AND THEIR PREVENTION (M. Intons-Peterson & D. Best eds., forthcoming).

3. See Valerie F. Reyna & Charles J. Brainerd, *Fuzzy-trace Theory and Children's Acquisition of Scientific and Mathematical Concepts*, 3 LEARNING AND INDIVIDUAL DIFFERENCES 27 (1991).

are mutually constraining. As he puts it, "the two [representations], while systematically independent, are behaviorally interdependent."<sup>4</sup>

To take a simple example, the verbatim representation of a contract prevents parties from extrapolating well beyond the scope of the contract. It provides an authority that is separate from the, perhaps arbitrary, interpretations of involved parties. However, the rigidity of any contract (no matter how well conceived and executed) at the verbatim level cannot capture the true essence of the agreement. Setting aside the thorny issue of miscommunication between parties, Wohlmut's analysis suggests that there is, in principle, an essence to the contract at the level of gist. This essence does not cover all possible contingencies, but it represents a flexible and nonarbitrary rendering of the agreement.

An important implication of this analysis is that pinning down the essential meaning of a contract, a constitution, or a statute in verbatim wording could be fruitless, and even undesirable. In Wohlmut's phrase, "literalizing meaning" has inherent limitations that have to do with the properties of verbatim representations. These limitations are only partially addressed by written and other means of recording exact wording. Human behavior must conform to laws and contracts without constant reference to explicit documents. Thus, as a practical matter, verbatim inputs must be coordinated with gist-based reasoning and decision making.

Furthermore, adding more words and better phrases to documents can increase their precision, but precision is not the same as accuracy. In other words, greater precision does not guarantee that the essence of a law and its applications have been represented better. For example, it is well known in psychology that a specific and detailed description of an event is generally more believable than a general or vague description. However, adding detail to any description provides additional opportunities for error; if we stipulate the color of every object in a room, we are more likely to be wrong about at least one color, than if we did not mention the colors at all.<sup>5</sup> Therefore, more precise descriptions are, all other factors being equal, more likely to be inaccurate.

As Wohlmut points out, the distinction between verbatim and gist levels of representation is not the same as the distinction between the letter and spirit of the law. First, the gist of a law or contract is not tied to intent in the way that some interpretations of the "spirit of the law" have been. Extending the reach of the law to intentions opens the door, as Wohlmut argues, to the "pursuit of special platforms and interests."<sup>6</sup> Second, the spirit of the law generally does not coincide with the content

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4. Paul C. Wohlmut, *Jurisprudence and Memory Research*, 8 J. CONTEMP. LEGAL ISSUES 249, 252 (1997).

5. Amos Tversky & Daniel Kahneman, *Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment*, 90 PSYCHOL. REV. 293 (1985).

6. *Id.*

of the law; in fact, it is typically juxtaposed with the content. Gist, however, does capture informational content. If a reader describes the gist of a book, for example, information about its content is conveyed. Third, the spirit of a law is notoriously difficult to identify. Techniques have been developed in the context of psychological research, however, to assess the nature of gist representations used in a variety of tasks.<sup>7</sup>

As the traditional distinction between the letter and the spirit of the law makes clear, there is general recognition of the need for flexibility in interpreting the law, that narrow literalism can subvert the law. Wohlmuth proposes that gist representations afford such flexibility, but he also acknowledges the need for constraints. Because gist incorporates informational content, it provides some constraint on interpretation. This assumption is one of several points of dissimilarity between fuzzy-trace theory and constructivism.<sup>8</sup> In its radical form, constructivism implies that interpretation is not constrained, except by social factors that, in turn, need not be grounded in objective reality. Another important implication of Wohlmuth's analysis, then, is that a rejection of literalism need not commit one to radical constructivism.

Constraints on the use of gist representations are also provided by verbatim representations, as noted earlier. The two kinds of representation limit each others' problematical aspects. Support for Wohlmuth's thesis can be garnered from research on judgment and decision making. For example, Reyna and Brainerd describe a series of relevant experiments on framing effects in decision making.<sup>9</sup> Those experiments replicate the finding that framing the same decision in terms of gains (e.g., lives saved) versus losses (e.g., lives lost) produces shifts in choices from risk aversion to risk seeking: in choosing between two programs to combat a disease that is expected to kill 600 people, saving 200 people for sure is usually preferred over a 1/3 chance of saving 600 people; and a 2/3 chance of 600 people dying is preferred over 400 dying for sure. Evidence indicates that this shift occurs because decisions are based on gist representations of the options: saving some people for sure is preferred to possibly saving none, and possibly no one dying is preferred to some people dying for sure.<sup>10</sup>

However, when the expected values of the two options are made unequal—for instance, saving 200 people for sure is pitted against a 1/3 chance of saving 615 people—preferences reorient in the direction of expected values. People prefer the risky option for lives saved when its

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7. See Reyna & Brainerd, *supra* note 3; Valerie F. Reyna & Charles J. Brainerd, *Fuzzy-trace Theory: Some Foundational Issues*, 7 *LEARNING AND INDIVIDUAL DIFFERENCES* 145 (1995).

8. See generally Valerie F. Reyna, *Conceptions of Memory Development, with Implications for Reasoning and Decision Making*, in *ANNALS OF CHILD DEVELOPMENT* (Ross Vasta ed., forthcoming); Reyna & Brainerd, *Fuzzy-trace Theory: Some Foundational Issues*, *supra* note 7.

9. See Reyna & Brainerd, *supra* note 1.

10. See Valerie F. Reyna & Charles J. Brainerd, *Fuzzy-trace Theory and Framing Effects in Choice: Gist Extraction, Truncating and Conversion*, 4 *J. BEHAV. DECISION MAKING* 249 (1991).

expected value is higher (205 vs. 200 in our example), and prefer the sure option for lives lost when its expected value is higher.<sup>11</sup> In that case, preferences are based on quantitative details rather than qualitative gist. This kind of shift from crude qualitative processing to more precise quantitative processing illustrates Wohlmut's point that verbatim representations of information can constrain the use of gist. In an interpretation of legal text, therefore, it is plausible that reference to exact wording might guide the use of gist representations, but ultimate authority would not rest in the wording.

Fuzzy-trace theory explains the entire range of framing results, framing effects and reorientation based on expected values, by assuming that verbatim and gist representations are extracted in parallel and that they inform one another. Qualitative gist is the default level of representation, and is used if there is no discordance with the verbatim level. If verbatim representations support different preferences, however, decision makers can move up the hierarchy of gist, and operate at a more precise level. Apropos of Wohlmut's point about mutual constraints, decision makers apparently operate on at least two levels simultaneously; the use of gist-level representations is constrained by the verbatim level.

Most of the psychological research that has been conducted, however, concerns interference between gist and verbatim representations, rather than the coordination observed in the framing experiments. Both kinds of interference have been documented: interference of verbatim representations in tasks that call for gist, and vice versa.<sup>12</sup> For example, Brainerd and Reyna presented related sentences to children, and then tested their comprehension of the presented sentences and inferences authorized by those sentences.<sup>13</sup> They found that preschoolers experienced interference from verbatim memories for presented sentences. The preschoolers rejected inferences because they were not represented, as presented sentences were, in verbatim memory. Younger children relied on their verbatim memory in answering questions about the content of events, whereas older children and adults tended to rely on gist memory.

In other experiments, they presented pictures that expressed similar content, rather than sentences, and found that pictures improved memory but further reduced acceptance of inferences.<sup>14</sup> Conversely, in still other experiments, manipulations that decreased memory for presented material

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11. Reyna & Brainerd, *supra* note 1.

12. For a review, see Valerie F. Reyna, *Interference Effects in Memory and Reasoning: A Fuzzy-Trace Theory Analysis*, in *INTERFERENCE AND INHIBITION IN COGNITION* 29 (Frank N. Dempster & Charles J. Brainerd eds., 1995).

13. Charles J. Brainerd & Valerie F. Reyna, *Memory Independence and Memory Interference in Cognitive Development*, 100 *PSYCHOL. REV.* 42 (1993).

14. *Id.*

improved acceptance of inferences.<sup>15</sup> Interference from gist memories in verbatim tasks has also been reported by numerous investigators.<sup>16</sup> Even when carefully instructed to accept only exact replicas of presented sentences, children and adults tend to misrecognize inferences as having been presented. Thus, the coordination of verbatim and gist memories is not a simple matter.

Interestingly, as children get older, they are better able to dissociate the two kinds of representation when the task requires it.<sup>17</sup> As Wohlmuth mentions, the ability to ignore verbatim cues is crucial in highway driving, especially at high speeds and under adverse conditions, for example, yielding or merging when lane lines are confusing. As Wohlmuth states, "...traffic self-regulates. It can even systematically and self-protectively ignore a yield sign."<sup>18</sup>

Wohlmuth uses highway driving to illustrate the larger issue of internal and external regulation of behavior. "Enduring memory" of the gist of legal maneuvers described in the Motor Vehicle Code guides driving behavior (e.g., how to yield at an intersection), but signs, lines, and other explicit cues must be reacted to appropriately. As the examples of interference between verbatim and gist representations indicate, memory for gist may be used when verbatim cues should be determinative, and vice versa, but the more difficult challenge is to regulate behavior both internally and externally simultaneously. Thus, in the example of highway driving, better performance should be achieved when drivers draw on both gist memory for rules and regulations and verbatim cues that relate to current conditions (e.g., verbatim memory for the fact that a specific exit—number 117 not 118—is closed). Also, as in the example of commercial law, better performance should be achieved if parties to a contract draw on both gist memory for its essence and on verbatim memory for its specific provisions.

Wohlmuth's analysis of internal-external regulation of behavior parallels the results of some recent research, although this subject remains largely unexplored in the psychological literature. In the past year, experiments have been conducted that demonstrate the interaction of internal and external factors in false memory. That work begins to address

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15. Valerie F. Reyna & Charles J. Brainerd, *Fuzzy Memory and Mathematics in the Classroom*, in *MEMORY IN EVERYDAY LIFE* 91 (Graham M. Davies & Robert H. Logie eds., 1993).

16. See, e.g., Brian P. Ackerman, *The Source of Children's Source Errors in Judging Causal Inferences*, 54 *J. EXPERIMENTAL CHILD PSYCHOL.* 90 (1992); Valerie F. Reyna & Barbara Kiernan, *Children's Memory and Metaphorical Interpretation*, 10 *METAPHOR & SYMBOLIC ACTIVITY* 309 (1995); Valerie F. Reyna & Barbara Kiernan, *The Development of Gist Versus Verbatim Memory in Sentence Recognition: Effects of Lexical Familiarity, Semantic Content, Encoding Instructions, and Retention Interval*, 30 *DEVELOPMENTAL PSYCHOL.* 178 (1994).

17. Reyna & Kiernan, *The Development of Gist Versus Verbatim Memory in Sentence Recognition: Effects of Lexical Familiarity, Semantic Content, Encoding Instructions, and Retention Interval*, *supra* note 16.

18. Wohlmuth, *supra* note 4, at 262.

Wohlmuth's question about what makes a leading question leading. Reyna and Lloyd<sup>19</sup> classified some well-known, and some recent and lesser known, forms of memory falsification along a continuum of internal versus external suggestion. For instance, they noted that misrecognizing inferences as having been directly experienced—the classic false-recognition effect of Bransford and colleagues<sup>20</sup>—falls near the internal end of the continuum, and, therefore, has been dubbed "autosuggestion."<sup>21</sup> When people misrecognize inferences as having been explicitly stated (e.g., "the bird is under the table" is misrecognized when "the bird is in the cage" and "the cage is under the table" was stated), they presumably internally process the meaning of what was stated and recognize that meaning in later tests.

These false-recognition effects have been widely demonstrated in children and adults.<sup>22</sup> Similar results have been obtained in the say/mean paradigm, a procedure in which children claim that they heard inferences explicitly in texts that were read to them, confusing what was said with what was meant.<sup>23</sup> Say/mean confusions also appear to be the result of internal memory falsification because misidentification occurs spontaneously for meaningfully related material, without any special prompting from interviewers. In contrast to these examples of autosuggestion, standard misinformation effects fall near the external end of the suggestibility continuum. These memory distortions are prompted by external events, such as leading questions or other varieties of misinformation provided by experimenters or interviewers (although they can be augmented by internal processes).

Between the extremes of autosuggestion and external suggestion, several intermediate kinds of memory falsification have recently been identified.<sup>24</sup> Mere-memory testing effects are an example of such intermediate effects.<sup>25</sup> In mere-memory testing, responding to unrepresented distractor items on an initial recognition test increases the probability that these

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19. Valerie F. Reyna & F.L. Lloyd, *Theories of False Memory in Children and Adults*, 9 LEARNING AND INDIVIDUAL DIFFERENCES (forthcoming 1997).

20. See, e.g., John D. Bransford & Jeffrey J. Franks, *The Abstraction of Linguistic Ideas*, 2 COGNITIVE PSYCHOL. 331 (1971).

21. See Charles J. Brainerd et al., *False-Recognition Reversal: When is Similarity Distinctive?*, 34 J. MEMORY & LANGUAGE 157 (1995); Reyna, *supra* note 12.

22. See, e.g., Lynn S. Liben & Carla J. Posnansky, *Inferences on Inferences: The Effect of Age, Transitive Ability, Memory Load, and Lexical Factors*, 48 CHILD DEV. 1490 (1977); Scott G. Paris & Ann Y. Carter, *Semantic and Constructive Aspects of Sentence Memory in Children*, 9 DEVELOPMENTAL PSYCHOL. 109 (1973); Reyna & Kiernan, *The Development of Gist Versus Verbatim Memory in Sentence Recognition: Effects of Lexical Familiarity, Semantic Content, Encoding Instructions, and Retention Interval*, *supra* note 16.

23. Carole R. Beal, *Development of Knowledge about the Role of Inference in Text Comprehension*, 61 CHILD DEV. 1011 (1990); Carole R. Beal, *The Development of Text Evaluation and Revision Skills*, 61 CHILD DEV. 247 (1990). See also Reyna, *supra* note 12.

24. See, e.g., Reyna, *supra* note 2.

25. See Charles J. Brainerd & Valerie F. Reyna, *Mere Memory Testing Creates False Memories in Children*, 32 DEVELOPMENTAL PSYCHOL. 467 (1996).

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distractors will be falsely accepted on a later test. The effect occurs for those items that are semantically related to presented items, but generally not for those that are unrelated. Consistent with some of Wohlmut's observations about the fragility of child witnesses' memories, this effect is especially robust in young children.

To clarify the nature of the mere-memory testing effect and its relevance to Wohlmut's remarks about testimony, if the word "apple" is presented on a study list, and "fruit" is tested along with other presented and un-presented words, misrecognition of "fruit" on a later test will be higher compared to un-presented words that did not appear on the first test. Later false recognition of an unrelated word, such as "hammer", that does not share meaning with any of the presented words, is not similarly elevated by prior testing. Mere-memory testing is clearly an intermediate form of memory falsification because it incorporates both an external manipulation, the initial recognition test, and an internal process much like autosuggestion, in which generated meaning supports false recognition. Although the mere-memory testing effect was initially demonstrated in our lab with children, it has since been replicated with adults.<sup>26</sup>

Another intermediate form of memory falsification is created by a version of the say/mean paradigm (in which children must distinguish between what was said in a story versus what was meant) that involves variations in memory cuing. In an interesting series of studies, Brian Ackerman has shown that say/mean confusions increase when inferences are cued prior to memory testing.<sup>27</sup> As the number of cues goes up, text comprehension improves, but verbatim memory accuracy declines. Thus, external cues increase internal inferences that are then falsely attributed to actual experience.

Reyna obtained a similar effect in adults, one that can be seen to bear directly on Wohlmut's concerns about testimonial accuracy.<sup>28</sup> In two experiments, she presented multiple texts recounting the same event; the versions agreed with one another in some respects, and differed in others. She found that repeated implications were more likely than single implications to be judged as having been stated explicitly in the presented texts. Some recent results by Henry Roediger and Kathleen McDermott that have been obtained with word lists can likewise be attributed to

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26. See Kathleen B. McDermott, Testing Enhances the Illusion of Remembering, presented at the 37th Annual Meeting of the Psychonomic Society, Chicago, Ill. (1996); David G. Payne et al., *Memory Illusions: Recalling, Recognizing, and Recollecting Events That Never Occurred*, 35 J. MEMORY & LANGUAGE 261 (1996).

27. See, e.g., Brian P. Ackerman, *The Source of Children's Source Errors in Judging Causal Inferences*, 54 J. EXPERIMENTAL CHILD PSYCHOL. 90 (1992); Brian P. Ackerman, *Fuzzy-Trace Theory: A Grand Theory*, 7 LEARNING & INDIVIDUAL DIFFERENCES 77 (1995).

28. See Reyna, *supra* note 8.



repeated cuing of similar meanings.<sup>29</sup> Using a procedure developed by James Deese,<sup>30</sup> Roediger and McDermott presented study lists composed of multiple semantic associates of a critical unrepresented word. On later recall tests, subjects falsely recalled the critical word at levels approaching those of some presented words. Roediger and McDermott and others have detected this effect for recognition as well as recall.<sup>31</sup> Again, the high levels of false memory observed with the Deese procedure seem attributable to repeated cuing of certain meanings.<sup>32</sup>

In the Reyna studies,<sup>33</sup> false recognition of an implication was also greater when the two versions of events differed rather than agreed with one another. Although contradiction increased acceptance of implications that were never presented, it decreased recognition of verbatim sentences that actually had been presented, a new type of dissociation between verbatim and gist memories.<sup>34</sup> Again, external manipulations, such as repetition and contradiction, were found to increase false recognition of items that were internally connected via semantic relations. It should be noted, however, that there are other effects that demonstrate how external manipulations can decrease false memories. False-memory effects decrease, for example, when people are asked to make an explicit source-monitoring decision. Thus, if people are asked to indicate whether they remember that material was in a book versus a movie based on the book (or neither), they tend to be more accurate than if they are simply asked whether the material was in the book.<sup>35</sup>

In short, false-memory effects are sprinkled all along the continuum of internal to external causation. False memories can be generated internally, through autosuggestion without external supports; they can be elicited through the interaction of internal processes and external cues; and they can be directly implanted by external misinformation. Within each of these broad categories, variations in conditions produce a variety of effects. The familiar kinds of false-recognition effects obtained by Bransford and colleagues, attributable to spontaneous inferential processes, can be magnified by repeatedly cuing those inferences.<sup>36</sup> The tendency to misrecognize semantically consistent material can also be augmented

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29. Henry L. Roediger & Kathleen B. McDermott, *Creating False Memories: Remembering Words Not Presented in Lists*, 21 J. EXPERIMENTAL PSYCHOL. 803 (1995). See also Henry L. Roediger et al., *Misinformation Effects in Recall: Creating False Memories Through Repeated Retrieval*, 35 J. MEMORY & LANGUAGE 300 (1996).

30. See James Deese, *On the Prediction of Occurrence of Particular Verbal Intrusions in Immediate Recall*, 58 J. EXPERIMENTAL PSYCHOL. 17 (1958).

31. See, e.g., Payne et al., *supra* note 26.

32. See Ackerman, *supra* note 16; Reyna, *supra* note 8.

33. See Reyna, *supra* note 8.

34. Cf. Charles J. Brainerd et al., *False-Recognition Reversal: When Similarity is Distinctive*, 34 J. MEMORY & LANGUAGE 157 (1995) (reporting the opposite result).

35. Reyna & Lloyd, *supra* note 19.

36. See Ackerman, *supra* note 27.

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simply by neutral exposure to the material on prior tests.<sup>37</sup> Finally, external misinformation seems to produce multiple false-memory effects, including misinformation acceptance because of confusion about its source. Explicit source monitoring can reduce that effect, but it does not eliminate it. As Wohlmuth's analysis of internal-external regulation suggests, the coordination of internal and external factors is cognitively complex. When to coordinate internal and external inputs and when to suppress one or the other, is not a trivial task (and is not always conscious).

Summing up, Wohlmuth has extended some key findings of modern memory research, especially the fuzzy-trace theory data base on properties of verbatim and gist memories, to impressively diverse domains of legal scholarship—forensics, the motor vehicle code, commercial law, jurisprudence, and constitutional law. The sheer multiplicity of the resulting implications and insights leave little doubt as to the long-range productivity of his approach. Specifics aside, the mere potential to reformulate, and therefore begin to make progress on, some thorny questions in the law in terms of well-studied memory and inference processes is not to be lightly dismissed. At this point, therefore, perhaps the most pressing question is how the reformulation process that Wohlmuth has initiated can be nourished and expanded. Ultimately, that will require that strategies be developed for placing the tools that Wohlmuth has devised at the disposal of legal scholars generally.

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37. See Charles J. Brainerd & Valerie F. Reyna, *Mere Memory Testing Creates False Memories in Children*, 32 *DEVELOPMENTAL PSYCHOL.* 467 (1996).

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