Addressing behavioral elements in traffic safety:
A recommended approach

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Overview

The purpose of this paper is to describe a better way to go about the enterprise of altering the behavior of drivers, where far less progress has been made than in the engineering of safer roads and vehicles. In thinking about doing so, the concept "traffic-safety culture" is quite appropriate. In a sense, this paper presents the argument that a traffic-safety culture should involve a reordered set of values, different beliefs from those that are now common, and, as a consequence, altered norms for appropriate behavior of its members. This applies whether the notion of a traffic-safety culture is narrowly constrained to professionals working in the traffic-safety domain or is more broadly defined to incorporate much of the population of a nation.

The fundamental point presented here is that to reduce traffic-related deaths and injuries, we must take a far more enlightened approach to developing and implementing programs and policies than is presently the case. To achieve meaningful declines will require taking advantage of the vast stores of scientific understanding that are currently overlooked. The following paper includes a brief description of how we presently operate, why the current approach works poorly, why it occasionally succeeds, a listing of several pertinent well-established fundamental principles of human behavior, and a suggestion for how we can do better in the future.

Common sense nonsense

In principle, there are only two ways in which a program can fail to achieve its goal. Either it is based on an incorrect understanding of the phenomenon that it seeks to address, or the fundamental principles of a conceptually sound program are not effectively put in place. In traffic safety, we often come up short on both counts.

As an applied social psychologist, I am concerned by the degree to which—as a profession—the field of traffic safety seems to function almost exclusively on the basis of common sense notions about the nature and functioning of individuals, groups, and organizations. A large proportion of programs that are intended to alter human behaviors in ways that should result in safer travel— from consistently wearing a seat belt, to driving at safe speed, to avoiding various driving distractions, to not driving while impaired by any of several substances or conditions, to training new drivers—are based on overly simplistic notions of the determinants of human behavior. As a result, these efforts all too often fail. Sometimes the conceptual design of programs is predicated on incorrect or inadequate understanding of human behavior. In other cases, conceptually sound programs or policies are poorly implemented because the designer or practitioners fail to understand fundamental principles of the functioning of human organizations, institutions, and social

systems. In those cases where programs do succeed, it is often by luck more than through development and use of a sound conceptual underpinning. Important fundamental principles can be tapped inadvertently and sometimes they are, but hoping for good luck is not a particularly efficient approach.

Despite the availability of decades of research findings in the various social and behavioral sciences, which hold valuable insights that are applicable to our goal of modifying safety-related behaviors, we tend to turn inexorably and repeatedly to programs, policies, and laws that reflect a substantial failure to understand, and address, the tremendous complexity of human behavior. Instead of tapping what is known about human functioning, we routinely develop and implement approaches based on a few overly simplistic notions about human behavior. In particular, we assume (with unjustified confidence) that threatening punishment and providing factual information are effective ways to alter human behavior. "Raising awareness," dispensing traffic citations, and increasing prescribed penalties for infractions account for the majority of the efforts undertaken to influence human behavior in pursuit of traffic safety.

Clearly, knowledge plays some role in many human actions, but the notion that simply providing information will translate directly into changes in behavior is demonstrably wrong in most cases. It overlooks the large number of other determinants of behavior, presuming that wise behavior results directly from the possession of factual knowledge. It also presumes, incorrectly, that distributing facts or admonitions equates to the receipt, understanding, memory, motivation to comply with, and timely use of the intent of a message by the entire driving population. Every step in that process is fraught with complexities that degrade the ultimate effect of any message (National Committee for Injury Prevention and Control 1989).

Most programs that are designed to provide information or "raise awareness" are never evaluated. Those that are evaluated routinely illustrate the difficulty of changing safety-related behaviors. A recent example of efforts to alter behavior by providing information involves the hundreds of different books, brochures, pamphlets, and web sites intended to "educate" parents of teen drivers, with the intent of increasing the teens' safety. One unusually high-quality example of this approach was recently evaluated in two separate studies. Both found that distribution of this well-designed, practical, easily used guide had no effect on parental behaviors regarding their teens' driving (Goodwin et al. 2006; Chaudhary, Ferguson, and Herbel 2004). Educational programs to increase child safety seat use do no better (Zaza et al. 2001).

Despite readily available evidence in our everyday dealings with friends, family, and coworkers, humans cling tenaciously to the belief that individuals can be persuaded to engage in any behavior simply by being told that they should do so. Scientific evidence also abounds to indicate that human beings are not very easy to change. More than a third of a century ago, a prominent social scientist cited numerous instances of programmatic efforts to alter human behaviors that had failed to produce the behavior changes they sought (Etzioni 1972). He also cited evidence that adopting a more informed approach can produce changes in behavior.

Similarly, the belief that threatening punishment, or increasing the severity of threatened punishment, is an effective means to alter human behavior flies in the face of decades of research and numerous well-supported conceptualizations of human behavior. As with the misplaced faith in messages, beliefs about the effect of punishment also overlook the complexities of the human world that often render punishment-based programs substantially inoperative. As every child learns at an early age, the severity of threatened punishment is irrelevant if one can avoid being detected. They also learn that, if caught, it is usually possible to negotiate a far less serious end

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result, rendering the threat always less than it appears on the surface. Those critical principles are routinely ignored by programs that focus on issuing citations or making arrests and by policies that focus on increasing prescribed penalties. Although individuals involved in traffic law enforcement recognize and lament the leaks in the system, those who create the system tend to focus, in a largely futile effort, on plugging holes rather than on designing a well-integrated system, predicated on an understanding of individual human behavior as well as the functioning of human groups, organizations, and cultures.

Operating on the basis of implicit, rarely questioned beliefs and numerous corollary notions, about how to affect individual actions has resulted in a failure to achieve progress that is possible. Failing to appreciate that human behavior is at least as complex as physical and biological systems, we rarely take advantage of the fundamental theoretical principles of human functioning that are well known to psychologists, sociologists, political scientists, anthropologists, biologists, economists, human communication experts, and others whose life work is dedicated to understanding the many, complexly interrelated principles of human behavior. This limited vision of human behavior characterizes many fields, not simply traffic safety. Though this is not uniquely our problem, it is one that we need to correct. Using the vast stores of existing knowledge about human functioning to craft traffic-safety programs and policies will result in efforts that truly have the potential to achieve substantial reductions in deaths and injuries resulting from motor vehicle crashes. Although we can point to successes, they are much too rare, and we can do better.

Implementing poorly reasoned programs is immensely costly. Not only do such programs have little chance of working, they are doubly costly in that they consume limited resources (money, time, political capital) that might otherwise have been devoted to other, more productive undertakings. This is an important central concept in economics, known as the "opportunity cost" of an action, that seems rarely to be considered in traffic safety. When working with traffic-safety practitioners and advocates, one often hears some version of the statement: "If this saves just one life, it will be worth it." Although the sentiment expressed is understandable, the belief reflects an unacceptably naïve perspective. Absent unlimited resources, we really should devote what we have available to those programs and policies that are most likely to bring about change in the most prevalent problem behaviors. Saving one life by using funds, or other resources, that might have saved a hundred if applied differently is irresponsible, not noble.

The general point that science, rather than common sense, must guide our efforts if we hope to do better is hardly novel (Sivak 2002; Williams 2004), but in traffic safety as well as some other applied fields, the principle is followed poorly at best. Interestingly, medicine is the one other field where a poor application of existing scientific knowledge may fail to preserve lives that need not be lost. Despite that similarity to our field, there is far less tolerance for the application of "hunch-based" remedies in medicine than is the case in traffic safety.

The unfortunate truth is that most activities undertaken to improve traffic safety by altering driver/operator/passenger behavior have failed to achieve their goal to any meaningful degree. This assertion may come as a surprise to those outside the field and, perhaps, to many of those dedicated individuals whose lives are immersed in frontline efforts to reduce travel-related injuries and fatalities. It will surprise few researchers, however. A recently released report on national progress in improving traffic safety during the past decade (Farmer and Lund 2006) makes this point as well—identifying progress from vehicle engineering improvements—but finding little benefit resulting of our multimillion dollar efforts to address behavioral aspects of

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traffic safety. Further, more detailed, documentation of the few successes and many failures is included in the recent report "Countermeasures that work" (Hedlund 2006).

It is something of a puzzle that the failure to follow the existing literature on well-established principles mainly characterizes only the human side of traffic safety. The physical infrastructure, including both the roadway system and the vehicles we use, is designed with extreme care and detailed attention to relevant fundamental principles derived from scientific research. Human-oriented programs, on the other hand, tend to be designed—though perhaps concocted is a more appropriately descriptive term—with little or no attention to the literature on the functioning of humans and human systems (organizations, cultures, institutions). Although engineering efforts have generally been well grounded in the physical sciences, there are many instances wherein engineering interventions that are designed to address human behavior fail because they don't follow principles of human behavior as well as they follow principles of physics. It appears that the problem resides more in the domain of operation (physical vs. human phenomena) than in the disciplinary background or training of those who design the programs (engineers vs. others).

Successful programs in traffic safety

There have been some particularly noteworthy successes in efforts to alter drivers' behavior. There is a valuable lesson in the successes. Rather than being programs, or laws, these involved a combination of both, in recognition of the complexly determined nature of human behavior. It turns out that the clear successes we achieve tend to occur when scientifically sound concepts have been implemented, whether by design or through good fortune.

Promoting seat belt use, deterring drinking drivers

Perhaps the most widely acclaimed and broadly adopted strategy to alter driver behaviors in the past two decades has been the *high visibility enforcement* approach embodied in *Click-it-or-Ticket* programs to promote seat belt use and the deployment of well-publicized DWI check-points throughout a jurisdiction to deter alcohol-impaired driving. There is ample research evidence to indicate that, when properly employed (i.e., when the important underlying processes are engaged through careful program implementation), this approach produces increased belt use and decreased driving after drinking. It is significant that this approach derives directly from one of the standard theories in the sociology of deviance, *General Deterrence Theory*. This idea was brought most forcefully and clearly to the traffic-safety field—to inform DWI countermeasure efforts—by H. L. Ross (1982), a lawyer and academic sociologist.

Many who strongly embrace the principle that punishment must be swift, certain, and severe, probably have no idea that it originated with a sociologist and was supported by hundreds of studies of all manner of behaviors having nothing to do with impaired driving or seat belt use. Although it is not necessary to know the history of a conceptually valuable approach, it is important to understand the essential principles by which it operates. Simply invoking the general idea, knowing the name but not the substance, is insufficient. That lack of substantive understanding

can easily lead to the deployment of programs or enactment of policies or laws that fail to set important processes in motion.

Implementation fidelity

Substantially less progress has been made in deterring drinking drivers than in encouraging seat belt use. These are clearly different phenomena so that is not surprising. However, there has also been a difference in our approach to these behaviors. The value of a sound program can be lost if the underlying principles upon which it operates are not tapped by a specific implementation. That has occurred often in efforts to reduce impaired driving. This procedural error can be clearly seen where high-visibility enforcement programs often turn into mostly just enforcement, with insufficient attention given to ensuring widespread publicity. There are many reasons that this happens, but regardless of the reason, doing enforcement alone fails to invoke the underlying mechanism by which enforcement works most effectively—persuading large numbers of drivers that detection and punishment are (more) likely—with the result that program benefits are far less than they might be.

Another way in which the benefits of the general deterrence model are easily lost can be seen in the recent effort of the National Highway Transportation Administration to reenergize activities to reduce alcohol-impaired driving. The program was reported in the Aug 16, 2006 edition of the *New York Times* as follows:

> *"The National Highway Traffic Safety Administration announced Wednesday that it had signed up thousands of law enforcement agencies across the country to begin a campaign to crack down on drunken drivers through Labor Day."* [emphasis added]

The all important publicity about the program inadvertently informed drivers that this effort was apparently to last only for a few weeks, thereby undercutting the potential long-term effect that would otherwise be expected. Delimiting the time period such a program covers is comparable to publicizing that a DWI checkpoint will be implemented at a particular location, on a particular night, thereby providing the target population with the information needed to avoid program activity. The $11 million dollars spent on publicity for this program seem like a lot to invest for a two-week effect, or even a two-month effect, assuming there may have been some carryover benefit.

To effectively invoke the underlying principle of high-visibility enforcement programs requires that enforcement activities be publicized in such a way that potential drinking drivers believe that enforcement is being increased and are left with no idea where, how, or for how long the additional enforcement activity will occur. There needs to be a sufficient amount of visible enforcement activity—DWI or seat belt checkpoints—to sustain the credibility of the publicity but, because the chances of any individual driver actually seeing a checkpoint are small, high-profile media reminders are essential (Reinfurt 2004).

A program in Tennessee implemented a high-visibility enforcement program, deploying DWI checkpoints throughout the state for a year. The activity was widely publicized and involved

several checkpoints every weekend in varying locations, adhering closely to the basic principle. The result was a substantial reduction (20%) in fatal crashes involving a driver with an alcohol concentration of 0.10% or higher (Lacey, Jones, and Fell 1996). A more or less contemporaneous, but longer-lasting, program in North Carolina evolved into a "blitz" approach after the first several months, concentrating enforcement activity and publicity within a few 2-week to 3-week periods each year. Much like the recent national effort, the publicity in North Carolina also tended to explicitly identify the time periods that would be covered by the program. Despite deploying thousands more checkpoints each year than the Tennessee program, the North Carolina effort resulted only in a small, short-term decline in alcohol-related crashes. The effect lasted only through the initial program period, when publicized enforcement was both widespread and more or less continual. The Tennessee program, in contrast, appears to have produced a substantially greater and more enduring benefit, with less effort and at substantially lower cost. Following underlying principles, not simply general ideas, is critical.

In reality, neither programs nor policies or laws do anything to affect behavior. They are simply tools by which important principles can be invoked. If the principles are sound ones and are effectively put in place by a program or policy, the targeted behaviors are then quite likely to change. We would do well to think about trying to invoke principles, rather simply about passing laws or implementing programs. Although passing recommended laws or implementing evidence-based programs would seem to be the best we can do, it is not. Any strategy that, for whatever reason, does not successfully put in place the important principles it is intended to has little hope of achieving its goal. Thus, it is important to do more than simply go through the motions of enacting recommended approaches. Fidelity of implementation is critical.

The nature of human behavior

There is clearly insufficient space here to explain all that is known about human behavior by, literally, the hundreds of thousands of highly trained individuals whose lives are spent studying this extremely complex phenomenon. I do, however, want to offer just a few observations based on what I take from reading the literature of a number of disciplines for the past several decades. Although much remains a mystery about human behavior, just as is the case with the physical world, there is a good deal of understanding that currently goes unused as we try to develop programs to increase transportation safety.

Some fundamental principles of human behavior

Below are a few very broad, general principles that, it seems to me, are highly relevant to our efforts to improve traffic safety, but which have not often been actively used to guide program/policy development. Many of these have been the focus of a great deal of theoretical work. As we get down to details of putting programs in place, all too often the implications of these fundamental aspects of human behavior are lost.

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The result is goals are not met, injuries not prevented, and lives not saved.

- Humans understand, retain, and use only a small fraction of the "objective" information they hear or read. They generally use only the "gist," not the details, even of highly relevant factual information provided to them (Reyna 2004).

- Humans are not passive, information-receiving entities. Rather they are active, meaning-seeking, information-processing, impression-forming, emotionally driven beings (Bandura 1986; Jones et al. 1972; Shibutani 1966).

- Much behavior occurs in response to the immediate environment (both physical and social) in which individuals find themselves at any given time (Ajzen and Fishbein 1980; Etzioni 1972; Stokols and Altman 1987).

- Most individuals are strongly influenced by the behavior of others in nearly all things, though not so mechanically that they simply do what others ask or tell them to do. Social influence processes are far more complex than to fit such a deterministic notion (Bandura 1986, 1989).

- A substantial proportion of human action is habitual, rather than based on conscious decisions each time behaviors are performed (Ajzen 1991).

- All humans live in groups, both large and small, whose values and informal, unwritten rules influence their members' thoughts and behaviors (Norenzayan and Nisbett 2000; Triandis 1994).

- Humans are biological beings, many of whose behaviors are influenced to some degree by biological factors (e.g., sex and age-related conditions). For the most part, these biological factors cannot be altered—they can, however, be recognized and, in at least some instances, accommodated (Pinel 2007).

- Human organizations and institutions, not individuals, are the mechanisms by which most programs and policies are implemented. Understanding their functioning is critical to the effective implementation of those programs and policies (Kreitner and Kinicki 2004).

Knowledge into action

Shifting program and policy development away from a "shoot from the hip" commonsense based orientation to a theoretically grounded approach is not an easy assignment. Scholars and researchers in the social and behavioral science fields have not done a good job of translating their fundamental understanding—which, though less than perfect, is substantial—into usable guidelines for practitioners. Part of the reason for this is that many social/behavioral researchers do not see their efforts as directed toward specific applied questions (like how to reduce risky driving behaviors) so much as toward simply furthering our general understanding of the human condition. As a result, valuable insights and findings, with clear potential applicability in many domains, are left for others to translate into applications. The unfortunate, but not surprising, result is that those who develop programs, policies, and laws rarely know there is a substantial knowledge base upon which they might draw. Moreover, the existing knowledge is rarely available in a form that can easily be used by persons not familiar with the field from which it derives, be that psychology, sociology, economics, biology, mass communication, political science, or any of a number of other pertinent disciplines. Nonetheless, if we hope to alter human driving

behavior in ways that increase safety, our best hope is to understand the multiplicity of factors that are at play in human functioning.

Theory is invaluable

One of the more strongly endorsed fundamental principles of science, and one of the least understood by nonscientists, is the value of theory. In brief, a theory is nothing more than an attempt to use abstract concepts to capture and summarize as much existing factual knowledge as possible in a sufficiently concise form that it can easily be used. Theory can be thought of as analogous to a road map. Although it is an attempt to provide an understandable representation (conceptual model) of some reality, it doesn't need to perfectly reflect every detail of the terrain it describes in order to be useful. It doesn't have to be complete nor does it need to be completely correct. To be useful, a theory simply needs to be good enough to give the users some helpful guidance in reaching their goals or destinations. Without a map, a person can simply wonder around and may eventually reach an intended destination. A crude map can be very helpful, a more refined one even better, but a perfect representation of every feature of the landscape is not really needed. Kurt Lewin, widely considered to be the father of social psychology, was theoretically oriented but was also intensely interested in using scientific understanding to better the human condition. Probably his best known quote attests to the value of theory in guiding practical work, "There is nothing so practical as a good theory." (Marrow 1969).

When a theory has proved to be reasonably adequate in providing a concise, abstract description of a multitude of empirical facts about a particular phenomenon (e.g., a behavior or class of behaviors)—by generating accurate predictions—it can then be used as a tool to guide the development of programs to influence the behavior described. There are many such theories in the social and behavioral sciences that have been developed through the life work of thousands of individuals. These spell out general principles that can help guide programs and policies to alter driving-related behaviors. They point to the sorts of things that are necessary to success and also help to identify the kinds of approaches that, in view of how humans actually function, are simply hopeless and which we would do well to avoid.

As the fundamental principle of a traffic-safety culture, every program, policy, and law whose goal is to reduce motor vehicle-related injuries and deaths should be derived from, or be demonstrably consistent with, well-documented fundamental principles of human behavior. To implement this principle, we should consciously and conscientiously use existing, well-supported theories in several of the social/behavioral sciences as guides in developing program and policy ideas. In cases where a strategy has been developed in the absence of theoretical guidance, it should be carefully vetted against sound theory before being implemented. If there is no theoretical support, the plan should either be revised before implementation or scrapped. Allowing for the fact that much remains to be understood about human behavior, if there is no apparent theoretical support, but also no clear contraindication for a proposed program—something that would be rare—then it might be reasonable to proceed on a small-scale, trial basis, with a careful evaluation plan in place. This might seem to resemble present recommended practice—implement then evaluate—but it is different. Although evaluation is routinely suggested, or required, evaluation cannot salvage a fundamentally flawed approach. It can merely document its failure.

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Consideration of demonstrably effective programs can be a source of inspiration for how to tackle a different issue. This is one way in which a promising idea might arise from a nontheoretical base. However, trying to adapt a program to address a different driving behavior risks losing the fundamental principles by which the original program works. A careful conceptual analysis of an effective approach, to determine whether the principles by which it succeeds are appropriate to the new domain and can be similarly tapped with the same program structure, is important. If similar fundamental principles apply to the newly targeted behavior and can be implemented by a similar program, comparable success may be expected.

Some useful theoretical tools

To point to some valuable intellectual resources that have remained largely untapped by traffic-safety practitioners, advocates and researchers, I offer brief descriptions of three particular theories that have stood the test of time and scientific scrutiny. They have been developed through the efforts of dozens of researchers following the scientific process of conceptualization, prediction, assessment, revision, and refinement, over the past several decades. With each description, I offer what I believe to be some of the implications of these theories for the field of traffic safety.

Theory of reasoned action

The *Theory of Reasoned Action* (TRA) originated in efforts during the 1970s to reconcile the fact that attitudes were repeatedly found to have little or no relationship to behavior (Ajzen and Fishbein 1980). In the process of trying to resolve that seeming contradiction, by more carefully specifying just what "attitude" means and a mechanism by which it should reasonably predict (and "cause") behavior, researchers ended up with a broad general model of human behavior. In brief, TRA suggests that the likelihood of an individual engaging in a particular action is approximated by people's behavioral intent, which in turn is a function of their attitudes toward that particular action as well as beliefs about whether important others would expect them to engage in the action. Unlike many behavioral theories, TRA has been described algebraically, which is

$$B \approx B_i = w_1 \sum_{i=1}^{n} B_i E_i + w_2 \sum_{j=1}^{m} NB_j MC_j$$

highly useful, allowing the concise presentation of several elements and their inter-relationships:

where:

B_i = beliefs about the possible consequences(i) of the behavior

E_i = evaluation of the possible consequences

NB_j = normative beliefs about behavior by person j

MC_j = motivation to comply with expectations of person j

w_1, w_2 = weighting factors to indicate relative contributions of beliefs about the act, and normative expectations for a particular behavior

TRA applies only to those behaviors a person is able to perform; that is, they are not controlled by factors beyond the individual's influence or capability. It also does not apply to behaviors that are essentially habitual. This conceptualization has been used widely, in numerous applied fields, to guide the development of interventions to alter individual behaviors. Interestingly, though TRA has rarely been at the root of efforts to improve traffic safety, some of the more successful approaches are highly consistent with the tenets of TRA and could have been derived from it. In particular, high-visibility enforcement programs to encourage seat belt use or discourage drinking driving explicitly seek to affect drivers' "attitude" toward those acts by increasing their belief that a particular negatively evaluated consequence—citation or arrest—will occur. Similarly, in the past several years, a number studies have shown that altering perceptions about what others are doing and, therefore what is considered to be normative, can decrease excessive drinking (Perkins 2003) and driving after drinking (Goodwin 2004) among college students. TRA can be particularly useful in traffic-safety program development by fostering clear, precise thinking about the many tactics that might be tried. This kind of guidance often leads to novel ideas that would otherwise come to mind.

Social cognitive theory (Social learning theory)

Originally developed as an explanation of social learning (how individuals learn about social behaviors, as opposed to factual knowledge or skills), its originator Albert Bandura (1986) has expanded and refined *Social Cognitive Theory* (SCT) over the years to the point that it can be considered a fairly broad theory of human social behavior. Along with many other theoretical perspectives, SCT emphasizes the central role of social norms in guiding human behavior. Social norms, simply put, are well-understood, informal expectations for how members of any social group—be it family, friendship group, work organization, or entire society—are expected to behave. They are learned, largely by observation. Although norms are usually enforced only informally, they have an extremely powerful effect on human social behavior. Norms are particularly relevant to traffic safety, in part because laws can be viewed as formal codification of certain norms that are considered to be particularly important in a society. It is always understood in all societies that one should not kill another human being, with rare exceptions. Nonetheless in all modern societies this expectation is considered so important that it is formally codified. This points to one of the central features of the way in which laws influence human behavior. Rather than simply forcing individuals to behave in a way that they don't necessarily want, laws serve an informational function, communicating to members of a society that a particular behavior is considered particularly important. This is, to a substantial degree, how and why most traffic-safety laws work (and why others don't). It is simply not possible, at least in a democratic society, to force a population to comply with laws that do not represent widely embraced norms. It is, however, feasible to stress the societal importance placed on a particular behavior. And it is possible to bring the law enforcement powers of the state to bear on the small number who may wish to disregard a widely accepted law. There are very clear implications here for what are and are not realistic expectations for the role of law in promoting traffic safety.

A significant addition to Bandura's original theory of social behavior is an identification of the crucial role of perceived self-efficacy. It is now well documented that a critical determinant in human behavior, which intervenes between motivation and action, is the sense that one can actually perform a behavior. Those with little confidence in their ability to do so will give up easily, whereas those who believe they can will be far more dedicated. The use of child safety seats provides a good example of where this is highly relevant. Even today, a quarter century

after initial state requirements for parents to buckle their children into safety seats, these devices are still tedious, difficult, and trying to use. They require determination, physical adeptness, and sometimes substantial problem-solving ability. They also sometimes require great skill in persuading a strong-willed infant or toddler to do something he or she may not be inclined to do. Parents with little confidence in their ability to handle this nontrivial physical and interpersonal task will simply give up. Although perhaps inadvertently, many programs designed to provide safety seats and help parents learn to use them have also addressed parents' sense of self-efficacy to buckle-up their children. Another area where this concept is critical is in the need for parents to more effectively manage their teen's driving behavior, encouraging or requiring adherence to restrictions on the time, location, or conditions of their teen's driving. Some parents are quite good at persuading or negotiating with their teens. Others are often defeated by the teen's persistence, energy, and determination. Efforts to improve parents' sense of self-efficacy, along with information about what they should be doing, would seem to be a valuable undertaking by the traffic-safety community, and Bandura's theoretical conceptualization can provide guidance on how to do so.

Fuzzy-trace theory

Emerging from early research on the development of memory, *Fuzzy-Trace Theory* (FTT) has grown into a more general theory of human information-processing (Reyna 2004). In brief, FTT describes and explains the fact that humans do not generally use much of the objective, detailed, factual information they receive. Instead, they tend to reason based on imprecise ("fuzzy") stored information (known as "gist," rather than verbatim, memory). This has clear implications for how we try to persuade individuals about driving risk. It suggests that the use of anecdotes may be a wiser way to do this than by presenting statistical facts. A particularly significant finding of research undertaken on this model is that, whereas people tend to overestimate the magnitude of small risks, they also ignore very small risks. Given that the actual risk of a serious motor vehicle injury on any trip or even within a full year of driving is extremely small, FTT may be particularly useful in helping us understand why the driving public does not seem to be as concerned about traffic safety as traffic-safety professionals are and for helping us to know how to proceed in view of that discomforting fact. FTT also suggests that imprecise, intuitive analyses are preeminent in humans' thinking about risk. This directly contradicts the implicit assumptions about human information-processing that underlie many traffic-safety interventions. In combination with the implications of research suggesting the greater value of providing normative information to individuals, rather than factual information about risks of a nonnormative behavior (Perkins 2003), FTT may prove highly valuable in guiding traffic-safety practitioners in the future.

Implications for traffic safety culture

A truly meaningful Traffic Safety Culture ultimately must embrace only the principal value of effectiveness, eschewing all other motivations (including retribution, self-satisfaction, image-polishing, and extraneous political motivations). It will doggedly pursue only measurable benefits of programs and policies. A first step in that direction, indeed the root of the solution, is to recognize that human behavior is far more complex than can be explained by common sense notions. In order to progress very far, it will be necessary for us, as a (traffic-safety) culture, to

discard common sense ideas and the belief that because we are all humans, we necessarily understand how humans function. The lessons of the social and behavioral sciences must be learned, then adopted. Otherwise, we will continue to build programs that don't work, draining large proportions of extremely limited resources away from other initiatives that could. Fortunately, this does not require developing a new knowledge base; it simply means making better use of the vast reserve of information currently in existence. Even better, much of the most valuable existing knowledge has already been organized for us, through the development and testing of theory. We merely need to become better acquainted with the best, well established of these, then make conscious use of them.

Summary and recommendations

When programs or policies to increase traffic safety, follow well-established principles of human behavior, even if inadvertently, they are often successful. Those that follow common sense notions, which are often wrong and are always overly simplistic, generally fail. Accordingly, it is important to foster a deep-rooted dedication to developing approaches that tap fundamental principles of human behavior as detailed in the accumulated literature of the behavioral and social sciences. This is most efficiently done by following well-documented theoretical models. To set such a new direction, which is radical in action, though not as an idea, will require building an infrastructure and altering current values and beliefs—first within the traffic safety profession, then more broadly. A fundamental understanding that human behaviors are complex and simply can't easily be changed needs to supplant prevailing notions to the contrary. Demonstrable effectiveness of efforts to reduce crashes, rather than simply an appearance of being a good idea, needs to be the dominant value in a traffic-safety culture. Neither of these will be easy to accomplish, even within the relatively small circle of traffic-safety professionals. Simply telling individuals they should accept these notions will be no more effective than simply telling teens they should wear seat belts. Papers like this one won't bring about the suggested change. Guides, manuals, requirements in funding applications are unlikely to do much better. They may help contribute to the discourse, but human beings aren't that easy to change!

A critical step in moving the field toward this different way of thinking will likely be to demonstrate its success. That can be done by developing a mechanism whereby an understanding of the behavioral and social science literatures is brought directly to bear on a small number of salient, behaviorally based traffic-safety problems. It is unrealistic to believe that we can acquaint the masses, or even a small number of individuals, with all the requisite knowledge of the social and behavioral sciences. There are, however, individuals who already possess a good understanding of these literatures. Currently, researchers seem not to be directly involved very often in the development of programs. The primary involvement of researchers with practitioners occurs most frequently only through fleeting contacts at conferences, symposia, and workshops. A compelling argument can be made that to effectively put social and behavioral science principles to work in the design of programs will require inserting persons well versed in theoretical principles into the mix directly, rather than by trying to provide guidance primarily via written materials. That approach has been tried and it hasn't produced very well.

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This is an ambitious and fairly radical notion. Nonetheless, it seems a worth trying in a pilot program. A few well-trained social/behavioral scientists with an understanding of the practical issues in traffic safety, as well as a strong grounding in a variety of social/behavioral science theories, could be made available to consult with state-based traffic-safety program and policy advocates, practitioners, and administrators. Many such groups eagerly welcome assistance of this type. Unfortunately, what they often get is, at best, a two-hour seminar, a one-day workshop, or something equally limited wherein they are told far more than they can possibly digest and far less than they need to know. Instead of trying to educate many and doing it poorly, it is worth trying a different approach, wherein persons who are well versed in bringing theoretical principles to bear on practical issues are assigned to work with a state or other comparably influential group on an extended basis, to help with implementing more promising approaches. Resulting programs would then need to be carefully implemented and properly evaluated to assess the value of such an approach.

Should this approach prove to be useful, a permanent program could be developed that might roughly be modeled on the Epidemiologic Intelligence Service (EIS) that the U.S. Centers for Disease Control has operated for many years. Rather than focusing on a training experience for young epidemiologists as the EIS does, the focus would be more on providing seasoned experts to states, though they would undoubtedly also learn a great deal with every placement or assignment in addition to bringing expertise of their own to the state.

Regardless of the details of how such a program could, or should, be organized, we simply need to get beyond the notion that human behavior is somehow easily understood and that it can easily and inexpensively be changed. The kind of extensive abstract knowledge about human behavior required to do what I am suggesting cannot be disseminated through pamphlets, how-to guides, "Traffic Safety for Dummies" books, or any of the mechanisms we now use. Physicians are not trained that way, nor are traffic safety engineers. At least for the foreseeable future, the sort of knowledge needed to produce dramatic reductions in motor vehicle crashes will have to reside in individuals, not in documents. A well-trained, savvy individual can bring to bear general principles in a specific situation in a way that someone with the limited knowledge gleaned from reading simply cannot.

The analogy with medicine is illustrative, but limited. The public health system may be a better model. Once well-designed programs to implement principles are enacted, they do not require the knowledge of the originator to continue working. Community-based child passenger safety programs provide an example of this. Similarly, a well-conceived law will continue to work with no further effort needed from the originators. This is nicely illustrated by laws to implement comprehensive graduated driver-licensing systems. Consequently, it is not entirely unrealistic to think that a relatively small number of carefully selected and deployed individuals might reasonably have a dramatic effect on the quality of efforts to reduce traffic crashes for decades to come.

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Biographical statement

Robert Foss, a Social Psychologist, is a Senior Research Scientist at the University of North Carolina Highway Safety Research Center where he heads up the Center for the Study of Young Drivers. After early inquiries into group decision making and altruistic behavior, he turned to research on behavioral issues and the role of policy in traffic safety in the mid-1980s, focusing primarily on factors contributing to young driver crashes and the role of alcohol in injury risks. He and his research team designed the North Carolina and Delaware Graduated Driver Licensing systems and have assisted several other states in formulating their GDL programs. They have continued to study young driver crashes—leading to the addition of a passenger restriction to the North Carolina GDL program—and the long term effects of graduated licensing programs. They have conducted numerous surveys of both parents and teens to learn about their experiences with this new approach to young driver licensing and to determine how a better understanding of the parent-teen relationship might be used to further reduce crashes. In the past decade, Foss and his team have also developed and implemented multiyear studies to examine college-student drinking using direct measurement of breath alcohol concentration (BAC), to evaluate a social psychologically based program (correcting misperceptions of social norms regarding drinking by college students) to reduce drinking. They also used directly measured BACs to determine the shape of the risk curve for fatalities resulting from drinking among recreational boaters and have examined the effects of various drinking-driving laws, the role of alcohol in child traffic fatalities, and the effects of bicycle helmet laws.