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THE USE OF INCENTIVES  
TO INCREASE SAFETY BELT USE

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# THE USE OF INCENTIVES TO INCREASE SAFETY BELT USE

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## Belt Use Approaches That WORK!

Within the last year something new and successful has turned up amid efforts to increase lap/shoulder belt use. Amazingly, an approach has been found that actually has resulted in belt use rates of 70-90%. This contrasts to the rather dismal 10% belt use estimated for the U.S. as a whole, and is all the more impressive in view of conventional wisdom and past experience that nothing increases belt use in the U.S.A.

What is this magic? It is an incentive approach where, as part of a larger belt use campaign, a modest reward is given to some people seen wearing belts. Here are three examples:

1. At a Dupont plant in Pennsylvania, a seat belt information campaign was directed toward all 1200 employees. In addition, if belt use reached 90 percent (cars entering and leaving the plant parking lot), then everyone in the plant would receive a gift. If the 90 percent goal were not reached, no one would receive the gift. Thus, the stage was set for peer pressure as well as the gift to play a role. The 90% use rate was achieved, and it is reported that high belt use has continued since that time.
2. Dr. Scott Geller of Virginia Polytech Institute has carried out several research projects in which vehicles arriving at an institutional parking lot were randomly stopped, and if the driver were belted, he would receive a token. When the required number of tokens were accumulated, a modest gift was received. Shoulder belt rates of 60 percent were seen, with the expected decline after the incentive phase.
3. In a UNC Highway Safety Research Center study, students at the local high school were selected at random as they arrived or departed school parking lots and belted student or faculty members received \$5.00. From a baseline use rate of 18-19 percent, belt use peaked at 80 percent during the incentive phase. The research design calls for monitoring the course of post incentive "extinction" to document the degree and rapidity of the belt use rate decay that will occur.

In all three of these cases, belt use rates exceeded levels ever reported previously in the U.S. The upward change was very large and is particularly noteworthy in the face of previous promotional efforts which produced negligible change. Thus, it is useful to consider what these three efforts have in common.

The common thread is that when the desired behavior was observed (wearing the lap/shoulder belt), there followed a probability of an immediate reward. Even though the reward magnitude was quite modest, it had three other characteristics essential in maximum influence on habit formation:

1. The reward was more or less immediate.
2. It was directly related to the desired behavior.
3. It had a reasonable probability of occurrence.

Those characteristics constitute an important contrast to the usual "reward model" related to belt wearing. At present, society in effect says "if you wear the belt, there is a chance that you will receive a very great reward (saving your life). At the same time, there is only low probability that this reward will come your way."

Research shows that reward magnitude is not as important as reward probability. The three projects mentioned above were successful because the desired behavior had a reasonable probability of bringing a reward, though the reward was of small magnitude.

With that in mind let us consider briefly the results of half a century of scientific research, involving literally thousands of studies on learning and habit formation.

### Reinforcement in Learning

The basic principles of reinforcement apply to virtually all life forms high enough on the developmental scale to be capable of learning, including

human adults and children, primates, mammals, birds and animals down the developmental scale to rats, mice, and even lower.

And this is the gist of those thousands of research studies. As a general principle, the following is true: if a given behavior is exhibited (wearing a seat belt), and if within a suitable interval thereafter a positive reinforcing event occurs, then there is an increased probability of a repeat of that same behavior. On the other hand, if a given behavior occurs and no reinforcing event occurs soon after, there is a decreased probability of the subsequent behavior.

Suppose there is a baseline level of occurrence of behavior as shown on the hypothetical graph below in which a behavior is seen at a low level. The goal is to raise that level by following the behavior by suitable reinforcements, given with the necessary frequency to change the behavior.

The rate at which the behavior builds up depends on several characteristics of the reinforcement.

1. Frequency of reinforcement: The relative frequency of reinforcement could vary from a reinforcement every time the behavior is observed, to one reinforcement every five times, or every hundred times, etc. Better yet is a varying reinforcement pattern. Under this arrangement, reinforcement could be given according to a schedule varying from as often as every third time to as seldom as every hundred times. Each of these various patterns of reinforcement results in a different course of strengthening behavior.
2. Magnitude of reinforcement: The second characteristic of a reinforcement is its magnitude. Within a certain range, the greater the magnitude, relevance and desirability of the reward the more its influence on strengthening the behavior. Hardly surprising!

3. Immediacy of reinforcement: The third characteristic of the reinforcement is the length of time between the desired behavior and receiving the reward. In general, the more remote in time the reinforcement, the less the influence on behavior.

Perhaps all this seems an unnecessarily complicated way to describe what common sense may suggest. We have seen examples of the above ideas in teaching a child. When the child does something right, we can reinforce the correct behavior by a pat on the back, a smile, or saying "good". However, what we intuitively understand based on personal anecdote, has been thoroughly documented through research.

Now let's go back through the three characteristics described above and consider them in a bit more detail. First, the schedule (or pattern) of reinforcement is of importance, and we can examine the pros and cons of some variations. One approach is called continuous reinforcement. By this, we mean a situation in which the desired behavior is reinforced every time it occurs.

Think of a situation in which a laboratory animal reaches out with its paw to press an illuminated button, and a small pellet of food is dispensed by this action. There is a rapid acquisition and strengthening of the behavior. Pressing the lever occurs more and more frequently, with more precision and becomes strongly ingrained.

To measure how strongly ingrained the behavior has become, one can note how long the behavior persists after the reinforcement is discontinued. We of course, see an eventual decline in the behavior. With a continuous reinforcement, the decline is rather rapid. It is as if the animal rather quickly concludes that the "game" has changed and there is not much point in continuing. This decline in the absence of reinforcement is called "extinction."

Now contrast the above with an intermittent reinforcement pattern in which, during the reinforcement phase, the reward is not given every time, but is

given with varying degree of intermittency. Sometimes the animal may press the button four or five times before a reinforcement occurs, other times perhaps 200 or 2000. In that situation, the build up of the behavior is less rapid, but is much stronger in the long run because it persists much longer in the absence of reinforcement.

The second factor described earlier is the magnitude and desirability of the reinforcement. The more relevant, the more it has the property of strengthening the behavior. A raw turnip as a reward for correct spelling is less effective than a candy kiss (at least for the children I know).

The third characteristic of reinforcement is the time lapse between the behavior and the reward. The reinforcement is more effective if it is given rather soon after the behavior (the optimum time is within a few seconds). On the other hand, if the reward comes hours after the desired behavior many lower animals cannot even establish the "connection" between the one and the other. Even for humans, these remote reinforcements are somewhat less effective particularly among young children. Thus, it is better to give the reward to the person directly after observing them wearing the seat belt, as contrasted to taking their license plate number and sending the reward days later.

Finally, let's look at a combination of reinforcement characteristics, because they interact with each other. It is found that even though a reward of higher magnitude is better than one of lower magnitude, nevertheless, the magnitude of the reinforcement is not as important as its probability of occurrence.

A very high magnitude reward which only has a low probability of occurring is not very effective in strengthening behavior. For example, if an animal had to press a button ten thousand times a day for a year, but then received five tons of food, we would not be very successful in influencing its behavior.

As mentioned before, this is what is wrong with our current reinforcement model regarding seat belts. We in effect tell people that wearing belts can bring a very high magnitude reward (saving your life) but people correctly realize the probability of that reward is extremely low. On the other hand, if the probability of the reinforcement is high enough to be perceived as "real," then the reward can be of quite low magnitude and still give a profound boost to the desired behavior.

### Extinction

So much for the reinforcement phase, now let us consider the extinction phase. When reinforcements stop, the behavior begins to decay -- to extinguish. How fast and how complete the decay is depends on the preceding schedule and magnitude of reinforcements.

Also, as is obvious, the more developed the organism, the more complex is the interplay of other factors in determining this decay. For humans with their vast verbal ability to self reinforce, etc., certain behaviors seem virtually extinction proof. However, decay does unquestionably occur.

Given that this is so, the reaction might be "OK, after the reinforcement phase you're going to get extinction -- the behavior is going to decline; therefore, what is the point of going to the cost and effort of a reinforcement phase"?

That is a fair question, and one that must be applied to every highway safety countermeasure not just seat belts. Thus, after a temporary surge of police enforcement such as in a STEP program, extinction begins to occur. The effect does not last forever (if indeed there is any effect in the first place). Likewise, with other types of highway safety countermeasures, the effect diminishes after the program impact is over. In order to sustain a program, any program, it is necessary to have a continuation of effort.



Thus, we see that reinforcement frequency and magnitude affects behavior and its extinction over a period of time. As I said earlier, these principles are well established behavior characteristics that apply to virtually all living organisms, and have been documented in thousands of studies in anthropology, medicine, pharmacy, human and animal applications in military research, psychology, sociology, etc. Thus, it is now a matter of systematically applying these principles to the area of seat belt use.

#### Reinforcement Approaches to Belt Use

Therefore, what am I proposing? Am I proposing that from now on the only way we can get Americans to wear seat belts is to have people standing on the corner handing out dollar bills to random samples of those who wear seat belts? No, I am not making any such global proposal. (But it would probably be more cost effective than some of our existing programs -- such as overtime pay for STEP activities.)

What I am proposing is the use of incentive programs as a way to get something started toward higher belt use rates. In the U.S.A. we are figuratively flat on our back, about to take the ten count on this seat belt matter. Seat belt use has declined to an all time low. Most of what has been tried has not worked.

We are in the ignominious position of saying that lap/shoulder belts are the number one cost effective countermeasure in the entire highway safety field, but people don't use them, and we don't know how to get people to use them.

The one area that shows real hope is the incentive approach. In the very few applications that have been tried and documented, belt use levels have been achieved that are otherwise unheard of in this country. In view of all this I would like to offer some thoughts on operational and research issues in urging that this approach be given a reasonable try.

First, operationally, incentive programs are quite feasible for very significant parts of the population. Most everyone comes and goes, regularly, to specific institutions where they spend time. Through a series of institutionally focused programs it is possible to reach large portions of our driving population -- work, school, etc.

Most large corporations have safety programs, including off-the-job safety (where, inevitably, motor vehicle crashes are a leading loss). Thus, it would be quite possible to administer an incentive program in the work place setting, and would be quite consistent with concerns about off-the-job safety. Even for whole communities this approach is possible.

An incentive program can be administered at low cost and effort -- confined merely to a random schedule for stopping a few cars and giving out reinforcements. (Higher expense is encountered in the research aspects of this approach because of the necessity for labor intensive monitoring of use levels.)

Second, on the research side, there is very little knowledge at present of how these approaches work -- except for the few demonstrations mentioned. The next research requirement is for a systematic series of studies to "fine tune" the level of "dosage" that will make the program work best. For example, what is the level of reward below which no effect will be seen? We know it works for \$5.00. Would it work for a stick of gum? What magnitude of reinforcement?

We also need to know more about the kind of secondary reinforcement we need. Does the reinforcement need to be a direct reward each time, or will it work where a person builds up incentive tokens toward a later tangible reward?

We need to know what combinations of frequency-magnitude work best. Consider a factory of 1200 employees, and \$1200.00 of reward money. Is it better to give 1200 reinforcements at \$1.00 each, or 240 people \$5.00 each, or another combination?

Another area of needed research addresses another well known principle of behavior -- that one can sustain a given behavior (after initial reinforcement) with a diminished continuing frequency of reinforcement.

We also need research on various reinforcement models. There is a variety of "angles" one can think about. For example, would it be useful to base reinforcement on inter-institutional competition (two different high schools competing with each other with the winning school to receive a collective reward). There could also be intra-institutional competition.

Another model would be competition against a certain goal whereby all participants receive the reward if they collectively reach a certain goal.

Another research question concerns any ways the incentive model might need to vary in order best to "reach" various elements within society. There is, for example, some indication that belt use already differs with socio-economic status. Results may indicate that incentive programs have been more successful in reaching the higher socio/economic classes. The basic principles of human behavior apply to all, but some variations in the model and approach will no doubt be better for some groups than others.

It is also worth brainstorming about other ways positive incentives can be built into the "system" to encourage use. What about an interlock such that the stereo or air conditioner would only work if the belt were fastened? Bad idea? OK! Let's have some good ideas! Other approaches have been proposed such as increased insurance payoffs for accidents if people are belted. That has the problem of being a fairly high magnitude reward, but low probability of occurrence, also low immediacy.

### Summary

We have reached an historic low for belt use in the USA, and this low point is reached just when research shows even more clearly that lap/shoulder belts

are the single most cost effective highway safety countermeasure remaining. The conventional wisdom is that "nothing works" to make people wear belts. However, recent incentive program examples have achieved (at least for a period) the highest belt usage rates ever recorded in this country. Therefore, I am urging consideration of both research and operational exploration of these issues.

Incentive programs seem to be the one approach so far that works. There is good scientific underpinning to explain why it works. Within that scientific framework, a clear procedure exists for a program of research and application of these principles. I most strongly urge exploration of this promising area.

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