

## **Behaviour change communication: does it live up to its name?**

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### **Abstract**

Changing attitudes and norms have been found a successful route to adjusting unsustainable consumption habits in the developed world. Less clear is how communication campaigns encourage these changes.

To respond to criticisms of past communications campaigns, a field study was designed to track the progress of participants engaged in a range of communication activities aimed to change environmentally significant behaviours. The aim was to investigate the relationship between a model explaining how communication works and a theory which explains behaviour change.

Petty and Caccioppo's Elaboration Likelihood Model may help identify the sort of information to communicate and how to present it in ways which shift psychological thinking, and Ajzen's Theory of Planned Behaviour (TPB) predicts that under such conditions behaviour change is likely to follow.

This paper reports the findings of the study, which is that communication variables do have a positive impact on psychological variables and in doing so contribute to behaviour change. It concludes that for maximum success, communicators should consider both communication and psychological variables when designing and evaluating behaviour change communications.

**Keywords:** communication process, behaviour change, environmentally significant behaviour.

### **Introduction**

It has long been acknowledged that changing attitudes and norms can be a successful route to adjusting unsustainable consumption habits in the developed world. What is less clear is how communication campaigns work towards encouraging these changes. This paper details how examining variables from two well-respected theories could deliver enhanced communication effectiveness for those in civil society charged with ensuring the long term viability of their communities. The potential value of this study is that it may help to account for a lack of success of some mass communication campaigns in which knowledge acquisition has failed to have attitudinal and/or behavioural consequences (Darnton et al., 2005, Hobson, 2003, Jackson, 2005, Kollmuss and Agyeman, 2002, Owen, 2000). To respond to criticisms of past communication campaigns, a field study was designed to track several communication

activities<sup>1</sup> aimed to change environmentally significant behaviours. These activities were organised either by a non-profit environmental action group (developed out of the UN's 1992 Agenda 21 global action initiative) or by the local government body for the area. The activities were directed at adjusting behaviour associated with consumption in the areas of domestic energy use, food sourcing, travel behaviour or waste with the aim of achieving a community goal of a one tonne per capita reduction in carbon dioxide emissions by 2010/11.

## **Theoretical framework and literature**

Azjen's (1991) Theory of Planned Behaviour (TPB), an extension of the Theory of Reasoned Action (Ajzen and Fishbein, 1980), has been widely used to investigate the discrepancy between attitude and behaviour. But Stern (2000) argues that studies which investigate attitudinal variables only may fail to find clear results because of the impact of other types of causal variables, such as abilities, habits and levels of persuasion. This study responds to his call for a move towards combination studies to enable a more comprehensive understanding of the topic.

The Elaboration Likelihood Model (ELM) offers a "framework for organizing, categorizing and understanding the basic processes underlying the effectiveness of persuasive communications" (Petty and Cacioppo, 1986, p. 125). Petty argues that the model provides explanation for why favourable attitudes may fail to predict behaviour (Petty, Priester and Brinol, 2002). Sutton agrees that a weakness of the TPB is that while it can be used to identify beliefs to be targeted in an intervention it offers no assistance in how to change those beliefs (2002). This limitation of the TPB is acknowledged alongside the recommendation that models like ELM could be used to address it (Ajzen and Manstead, 2007).

The TPB and ELM have been used to inform a study of cycle helmet use (Quine, Rutter and Arnold, 2002), to inform a marketing activity aimed at increasing bus use (Beale and Bonsall, 2007) and to design an intervention to encourage children to exercise (Hill, Abraham and Wright, 2007). However, in each of these instances, the ELM was used only to provide insight into the design of the communication, not measured as part of the research study, although the empirical testing of the two models together was recommended (Beale and Bonsall, 2007).

## **Research aims**

The aim of the study is to explore how the two theories work together. One line of investigation is to explore whether they have combined effects on behaviour change. The other is whether they work in a causal chain<sup>2</sup>. This would see the ELM explaining the processes involved in directing communication at the TPB variables which are then changed and this leads to behaviour change (Ajzen, 2005, Conner and Armitage, 1998). More specifically, this would ask whether the ELM variables involvement (INV), ability to process (AP), argument quality (AQ) and source credibility (SC) directly influence the dependent variable behaviour (POSTELAB)<sup>3</sup>? Or, are their effects mediated through the TPB?

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<sup>1</sup> Communication studies which assess a single communication setting may find results due to a variable beyond the scope of the communication. Multiple settings identifies whether the model can be generalised (Devine and Hirt, 1989).

<sup>2</sup> The limitations of correlational designs to prove causal flow are discussed in data analysis section.

<sup>3</sup> The questions about activities since communication matched the requirements for a dependent variable for both theories. The ELM has been tested with a wide range of outcome variables including whether participants

## Methodology

The primary objective of collection was purposive in that it targeted people who had been exposed to an activity (Trochim, 2006), and these activities were limited in their ability to reach a truly representative sample of society. Participants ( $n=198$ ) were approached just after they had taken part in a communication activity. A control group was beyond the scope of this inquiry.

Two questionnaires were used to construct variables for both theories. Question items were drawn as much as possible from those found to have high reliability in previously published research. They were then re-worded to be context-specific, following advice that questions must relate to specific, not general behaviour (Ajzen, 1991). There were four to five question items for each variable and each question had either a four- or five-point scale response. The first questionnaire was conducted at the time participants took part in an activity and asked participants to respond to questions relating to the ELM independent variables and report their intentions (INTELAB). The second was conducted between four and five weeks later as this is frequently selected as an optimum time for messages to be acted on (Ajzen, 2002, Daigle, Hrubes and Ajzen, 2002, Sejwacz, Ajzen and Fishbein, 1980). It included questions about TPB independent variables and about behaviours since the communication activity (POSTELAB)<sup>4</sup>.

Survey items were tested for reliability by using only question items with Cronbach Alpha scores higher than .7 and for construct validity by using principal axis factoring with oblique rotation. Residuals tests indicated the data were not significantly different from normally distributed data and thus suitable for analysis using Ordinary Least Squares standard multiple regression. SPSS version 16 was used to assess the operation of the ELM, then the TPB, and finally a combination of the independent variables from these two theories in a single regression.

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read the information provided them (Bright et al., 2006) their intentions (Park et al., 2007) resulting knowledge, attitudes and behaviour change. (Roser, 1990)

<sup>4</sup> This causal ordering of questions was demanded by the time constraints for each interview but limited identifying INTELAB as a further mediating step as proposed by Ajzen.

## Results

**Table 1 Multiple Regression tables showing the predictive performance of the ELM and the TPB tested in separate regressions.**

	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	
	<i>B</i>	<i>SE</i>		<i>Sig.</i>
(Constant)	8.10E-006	.175		1.000
AQ	.033	.073	.036	.651
SC	.097	.043	.170	.026
INV	.138	.042	.258	.001
AP	.098	.047	.170	.036
Dependent Variable: POSTELAB				
<i>Adjusted R<sup>2</sup> = .242</i>				
	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	
	<i>B</i>	<i>SE</i>		<i>Sig.</i>
(Constant)	-1.33E-005	.163		1.000
INTELAB	.692	.098	.454	.000
SN	.199	.074	.170	.007
PBC	-.024	.045	-.033	.597
ATT	.166	.071	.150	.021
Dependent Variable: POSTELAB				
<i>Adjusted R<sup>2</sup> = .339</i>				

At the top of Table 1 it can be seen that INV, AP and SC are all significantly positively related to POSTELAB ( $p < .05$ ). In the bottom half of the table INTELAB, SN and ATT are all significantly positively related to POSTELAB. Given that this study has used the same dependent variable to measure ELM and TPB<sup>5</sup> and also that many theorists have combined models to see if this gives greater prediction (for a review see Wall, Devine-Wright and Mill, 2007), the next step was to conduct a regression comprised of all of the variables from the two regressions in Table 1 which were significantly positively related to POSTELAB.

**Table 2. Multiple regressions of all significant ELM and TPB variables.**

		<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	
		<i>B</i>	<i>SE</i>		<i>Sig.</i>
ELM variables	(Constant)	-.010	.163		.949
	SC	.069	.040	.121	.083
	INV	.052	.040	.097	.199
	AP	.044	.044	.075	.314
TPB variables	INTELAB	.505	.115	.332	.000
	SN	.167	.074	.142	.024
	ATT	.145	.066	.130	.030
Dependent Variable: POSTELAB					
<i>Adjusted R<sup>2</sup> = .363</i>					

Of interest in Table 2 are those variables no longer significantly positively related to the dependent variable. SC is close to significance and in a further regression, with the trimming

<sup>5</sup> See footnote 3

of INV and INTELAB in order to produce an optimal regression of only those independent variables which offer the greatest prediction of the dependent variable (Tabachnick and Fidell, 2007), SC was found to be positively significantly related to the dependent variable ( $\beta = .168, p = .009$ ). However INV and AP are non-significant predictors. Shrout and Bolger (2002) offer an explanation for why INV, which performed quite strongly ( $\beta = .258, p = .001$ ) when studied only with other ELM variables, is not a significant contributor in the combined ELM/TPB model. They argue that if a causal independent variable (in this case INV) is transmitted through additional links in a causal chain (one or more of the TPB independent variables), the size of the direct effect on the dependent variable typically becomes smaller. Such transmission can be identified by mediation analysis. Mediators occupy a position in between the independent variable and the dependent variable, with the mediator a proximal effect of the independent variable and also a proximal cause of the dependent variable (Hoyle and Robinson, 2004). While correlational designs cannot prove causal flow, evidence of mediation would be supportive in the building of evidence of causal mechanisms. (Haslam and McGarty, 2004, Shrout and Bolger, 2002).

Although widely used, the causal steps strategy to assess mediation (Baron and Kenny, 1986) can leave researchers open to type 1 and type 2 error if rigidly applied (Preacher and Hayes, 2008b). An alternative product of coefficients strategy focuses attention on the ‘indirect route’ of the independent variable to dependent variable through the mediator, and can be tested using bootstrapping. This product of coefficients and bootstrap analysis based on 5000 samples was conducted with the computational aid INDIRECT (Preacher and Hayes, 2004).

**Table 3 Involvement and AP assessed for mediation**

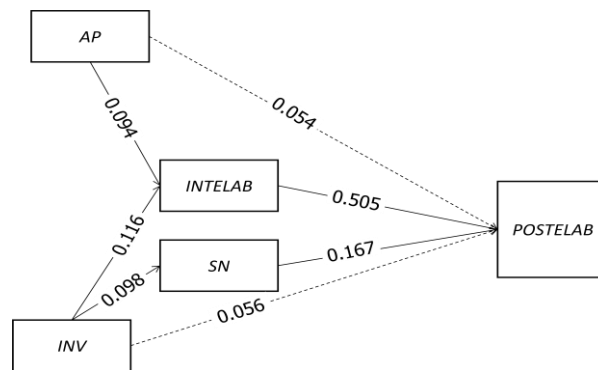
<u>INV to Mediators</u>				<u>AP to Mediator</u>			
	<i>Coefficient<sup>6</sup></i>	<i>SE</i>	<i>Sig.</i>		<i>Coefficient</i>	<i>SE</i>	<i>Sig.</i>
INTELAB	0.116	0.026	.000	INTELAB	0.094	.029	.002
SN	0.098	0.040	.016				
<u>Mediators to Dependent Variable</u>				<u>Mediator to Dependent Variable</u>			
INTELAB	0.505	0.118	.000	INTELAB	0.505	.118	.000
SN	0.167	0.074	.026				
<u>Total Effect of INV</u>				<u>Total Effect of AP</u>			
	0.144	0.043	.001		0.095	.049	.054
<u>Direct Effect of INV</u>				<u>Direct Effect of AP</u>			
	0.056	0.042	.162		0.054	.047	.246

Table 3 presents significant paths found while investigating the potential mediation of TPB variables by ELM variables. The left of the table shows the paths from INV to mediators INTELAB and SN and on to the dependent variable, which are all significant ( $p < .05$ ). With 5,000 resamples, a bootstrap bias corrected and accelerated confidence interval (CI) of (.023, .113) indicates 95% confidence of an indirect effect from INV through INTELAB that is not zero. The CI (.001, .045) for SN through INTELAB also indicates an indirect effect which is not zero. The effect size for INV through INTELAB can be measured by taking the products of the coefficients of the indirect paths (.116 x .505) and dividing by the coefficient of the total effect (.144). The proportion of the effect of INV travelling via INTELAB is estimated

<sup>6</sup> The coefficients presented here are unstandardized as recommended by Preacher (2008a)

to be 40.2%<sup>7</sup>. Using the same calculation the proportion travelling through SN is estimated to be 11.4%.

The right hand side of Table 3 shows the path of AP through INTELAB to the dependent variable. The CI (.017, .093) indicates that the finding of an indirect effect through INTELAB can be argued with 95% confidence. The proportion of AP travelling through INTELAB is estimated at 49.6%. These findings are illustrated visually in Figure 1.



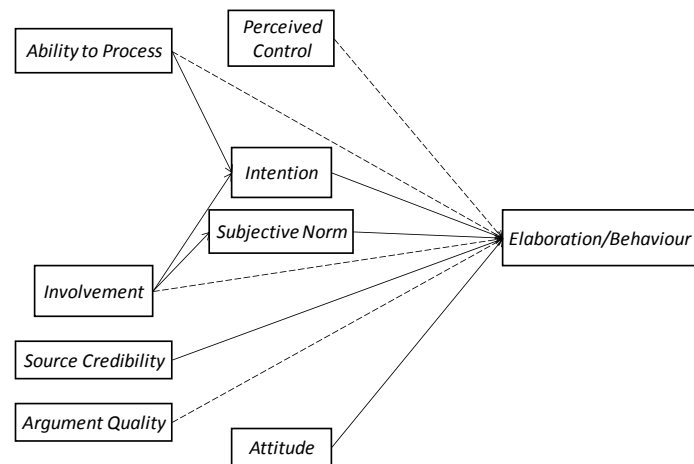
**Figure 1 Mediation summary showing indirect effect through INTELAB for INV and AP, and through SN for INV (all solid lines significant). Unstandardized coefficients taken from Table 3 indicate relative strength of each route.**

## Discussion

Findings from the regression and mediation analyses are summarised in Figure 2. Mediation analysis offers an explanation of the reduction of the expected effect of the variables INV and AP when measured in a combined ELM and TPB regression. Their contribution is masked by their mediation by TPB variables INTELAB and SN.

The finding of a significant indirect route for INV and AP demonstrates the usefulness of mediation in helping to draw out variables key to behaviour change. INV and AP would, using regression analysis alone, have been dismissed as having a role in predicting behaviour change. Also, by analysis of the communication context alongside the cognitive context researchers have the opportunity to address the earlier discussed weakness of the TPB as a tool to develop effective behaviour change interventions. They can identify which variables prompt change in the TPB independent variables that then predict behaviour change.

<sup>7</sup> The coefficients in the table have been rounded to three decimal places. These calculations were performed with the figures before rounding.



**Figure 2 Path diagram summary of combined ELM and TPB model. Solid lines depict significant relationships, dotted lines non-significant. Arrows denote assumed causal path.**

Increasingly communicators are being provided with psychological guidance (Darnton, 2008, Jackson, 2005) but this needs to be joined up in a protocol that gives clear insight into how messages can work to alter the variables identified by psychological theory as key to behaviour change. The communication industry can then use this insight to mould and deliver messages which are not just favourably received but trigger new thinking and lead to behaviour change. It is acknowledged that the industry struggles to effectively evaluate its work (Laborde and Pompper, 2006) so communicators need to step up their evaluation not just of communication outputs, but also to track how these are effective at changing attitudinal and behavioural outcomes.

This study tracked pre-existing communication activities not determined by psychological theory. It is recommended that future research might achieve stronger results if it was to study communication activities using both the ELM and TPB as a design protocol, as has happened with the TPB (Stead et al., 2005).

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