

# humaine

**D8h**

## **Final Report**

**Oliviero Stock and WP8 members**



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## The place of this report within HUMAINE

The final workpackage reports in HUMAINE have been designed as brief statements that complement other sources. On one hand, substantive content – particularly technical content – has been reported in deliverables throughout the project. On the other hand, several potentially overlapping sources are part of the final reporting process. In particular, the activity report for the final period sets out the goals achieved during the final period; and the final report for the project as a whole includes a relatively non-technical account of what the workpackage has achieved.

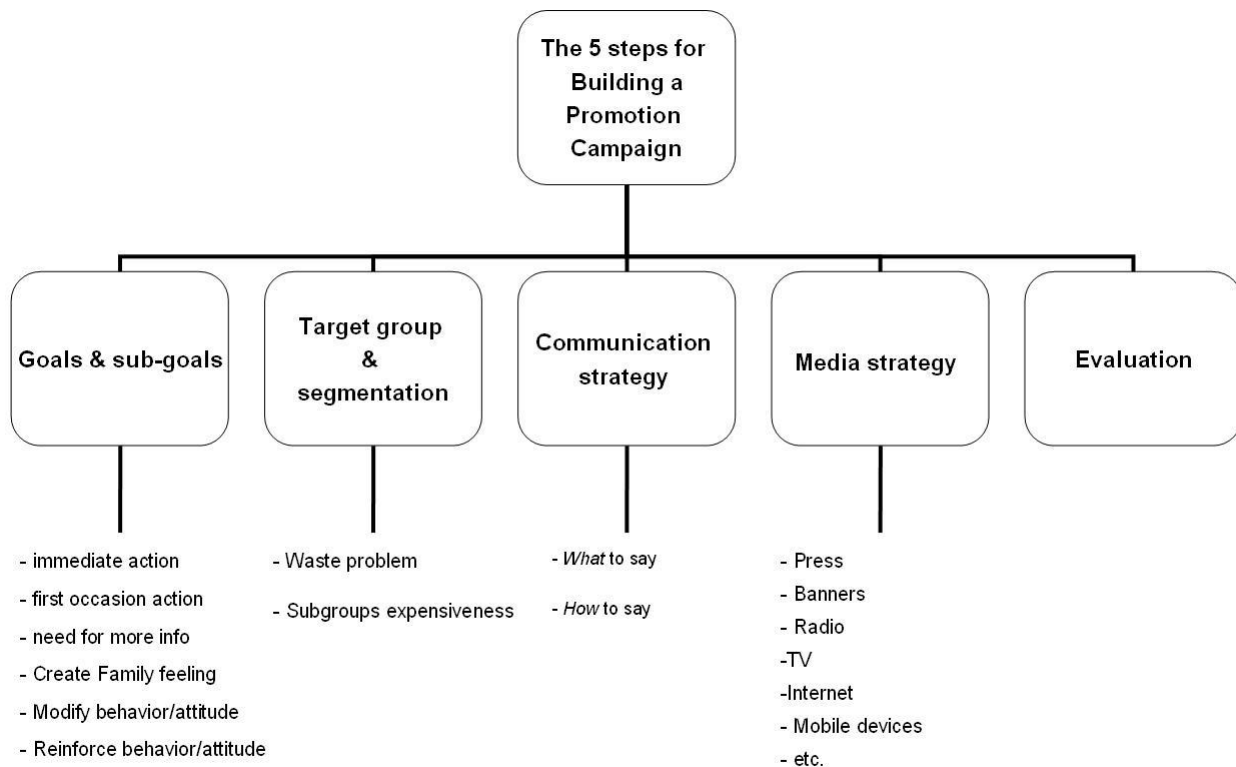
This core of this report is shared with the section on WP8 in the final report for the project as a whole. That consists of a short, non-technical summary of what the workpackage has achieved. However, there are details that do not belong in a report intended for the general reader (such as information about the participating institutions, meetings organised, etc). They are covered here.

Workpackage members invested a substantial amount of effort in the deliverables, and they form a continuing resource available to the community on the HUMAINE portal. They are listed for completeness. In some senses it would make sense to do the same for publications, but they are too difficult to allocate to individual workpackages. A full list is given in the final report for the project as a whole.

## Workpackage remit, membership and structure

Workpackage 8 had a specific computational aspect. Its aims were to help understand some of the critical issues for building persuasive, or otherwise emotion-inducing computational, systems and to test limited realizations that can be demonstrated as proofs of concepts for a novel class of systems. To this end we proposed the design of a promotion campaign framework, for any concept of social value, to be realised through a number of different technologies which has been the object of research within HUMAINE.

The idea was to: (1) start from the classical 5 step design of a promotional campaign and to see how the different technologies/components we developed can impact on its design and application (see picture below). (2) Exploit various means for the campaign: broadcasting-oriented, individual-oriented, interactive and so on. (3) Explore a range of specific scenarios.



The development activity incorporated three elements.

Element 1: **Basic persuasive communication**, including: Persuasion Models, Integrated model of emotion and politeness, A mobile persuasive storytelling guide, Gaze and eyes for persuasion.

Element 2: **Creativity for communication**, including: Creative verbal humour, False emotions in true lies, Music for persuasion.

Element 3: **Emotion and Language Processing**: including work on: a) building computational resources for dealing with evaluative or otherwise emotion-related language; b) taking care of natural language generation methods and narration; c) perform some specific research on emotion-related text processing, as far as useful for the purposes of the other two elements in WP8; d) develop technology for dialogue management useful for the interactive version of persuasion system.

Table 1 describes the contributions of WP8 partners along some **dimensions** that characterize technologies in the campaign. Numbers (ranging from 0 to 3) indicate the relevance of the theme for the specific WP8 participant's work. The main groups' activities and results under this reference framework are described in short in the sections that follow.

	Interaction Typology			Target			Message Modality			Validation implications and	
	Monological	Dialogical	Multiparty	Individual	Group	Broadcast	Mainly Verbal	ECA	Other Modalities	Ethical Issues	Evaluation methodologies
ITC-Irst	3	0	2	3	1	1	2	2	2	2	2
Univ. of Bari	1	3	0	3	0	1	3	3	0	1	2
ISTC Roma	3	2	0	3	1	1	2	3	3	2	1
Univ. of Augsburg	1	3	2	3	1	0	1	3	2	2	2
Heriott-Watt Univ.	3	1	0	3	2	1	3	3	1	2	2
University of Paris 8:	0	3	1	3	1	0	0	3	0	0	2
Queen's University of Belfast:	1	3	0	3	1	0	3	2	2	1	3
University of Haifa	2	0	0	3	0	0	1	3	1	1	3
Univ. of Twente	0	3	1	3	1	0	0	3	0	0	2

Table 1

## Main achievements (Element 1)

### Persuasion models

[ITC-Irst] has developed a cognitive model of persuasive reasoning in monological settings (planning and meta-planning) for integrating various persuasive strategies coming from different fields. The model accounts for various aspects of message creation: content selection and ordering, choice of adequate Rhetorical Relations and emotion displaying. A model of emotion-oriented lexical choice by using techniques of valence shifting was also created.

[ISTC-Roma] has proposed an accounting for the possible mingling and intertwining of emotional and non-emotional persuasion strategies, by investigating – in collaboration with BARI – how an emotional persuasive strategy par excellence such as *persuasion through arousal of emotions* can include argumentative components, and how the latter can be functional to arousing some emotion and, as a consequence of this arousal, to inducing some intention (and behavior) in the target; in particular, the focus has been posed on a subset of emotions to be aroused through persuasion: those stemming from sense of inferiority, such as emulation and envy. The domain of reference was healthy eating, in which a differentiated corpus of examples were found, ranging from advertising to messages produced by scientific agencies delegated to the promotion of a correct behaviour in this domain. The goals of a promotion campaign which most fit this approach are those of modifying or reinforcing the target's attitudes and behavior.

[DI-BARI] has cooperated with ISTC-Roma in defining theoretical aspects of emotional persuasion, and how the two phases of reasoning and argumentation can be simulated, with particular concern about uncertainty and strength of rational and a-rational strategies. They have developed a model of persuasive reasoning in dialogical settings, and a testbed to simulate 'what if' type of reasoning in this context (PORTIA). This experience allowed to (a) check how the formalism for representing 'classical' argumentation schemes can be revised to represent a-rational persuasion strategies and (b) verify how persuasion knowledge may be employed to answer 'critical questions' by the Receiver. The problem of recognizing the Receiver's reaction to persuasion attempts was studied by comparing two alternative methods: bayesian recognition and latent semantic analysis.

### Integrated model of emotion and politeness

[UA] has developed a prototype for simulating polite behaviour has been developed. It is augmented by a flexible mechanism that takes contextual or task knowledge into account for selecting politeness strategies. It uses different behavioural measures like reaction time of the user as well as for physiological measurements to capture more subconscious reactions to a polite system. This prototype is particularly suitable for the communication strategy step of a promotion campaign especially on the "how to say" part. Appropriate for the context of the promotional campaign is also the fact that the addressee's emotional state is taken into account during the selection process resulting in a specially tailored utterance which will have the maximal effect on the addressee.

## A mobile persuasive storytelling guide

[HWU] Design for a mobile persuasive storytelling guide attracting people to visit a new or renewed cultural site. It is a design for mono-directional communication and given that it personalizes the stories presentation, it can be used for personal and homogeneous groups' communication. The design is particularly suitable for those goals of a promotion campaign to induce "need for more information", "behavior/attitude modification" and "behavior/attitude reinforcing". It is also designed to inform and make aware, hence increase the appreciation of a cultural heritage.

## Gaze and eyes for persuasion

[UP8, UT] Implementation of an interpretation module, based primarily on the perceptual input of the listener's gaze, but also including a highly simplified language planning scheme. Reactive and cognitive backchannels through attention and interest has also been considered, as signalled through the gaze behaviour of a virtual listener, in order to define a speaker that alters its own gaze behaviours during discourse for the purposes of persuasion. This framework is particularly suitable for intervention in the "how to say" aspect of the communication strategy. Nonverbal communication for keeping the attention of the receiver is a key aspect for a successful persuasive communication. It is meant to enhance the impact of ECA's in dialogic but also in monological settings.

## Persuasive systems

[ITC-Irst] developed the *Promoter* prototype, for creating persuasive multimodal messages (experimented with ECA's and Kinetic Typography realizers). *Promoter* is designed for monodirectional communication and, given that it can produce tailored messages, it can be used for communication to an individual or to a homogeneous group. It can be used for advertising on the internet, on a stand alone computer with different multimodal realizers, or it can produce paper-based output. *Promoter* is suitable for mobile (PDA, mobile phones) context-aware devices that can produce messages at the proper location and situation, reducing the "waste problem" and "subgroup expensiveness".

[DI-BARI] developed the PORTIA prototype, the persuasive dialog simulation system. The prototype consider, in particular, the role played by uncertainty in reasoning about the mental state of the persuadees (their personality, values and beliefs), and in defining a "strength" for the alternative persuasion strategies available in a given context. The media in which the message can be produced are: natural language or ECA on a pc (private context of use), or ECA displayed on a kiosk or a wall (public context of use). The possibility of integrating the ECA into a virtual world has been investigated, to assess the increased value of combining natural language communication with images. Although the method developed is domain-independent, the application domain to which it is applied is that of a persuasion campaign aimed at influencing and changing behavior about healthy eating. To ground the methods developed on "real" data, a corpus of persuasion messages was collected and the comparative strength of alternative strategies was evaluated.

[QUB]: Development and evaluation of a prototype affect management (AM) component, or AM concept demonstrator, that could be deployed within the broader dialogue management module of a complete dialogue system, some of whose behaviour is persuasive.

### **Evaluation of Persuasive systems**

[ITC-irst; HU] drove a study with the *Promoter* prototype for assessing the impact of communicative strategies in different systems.

### **Ethics and social influence**

[ITC-Irst] the collaboration with the ethical committee led to the design of the ethical guidelines for persuasive systems developers. Furthermore some case studies have been collected by means of the guidelines-based questionnaire to WP8 partners.

## **Main achievements (Element 2)**

### **Creative verbal humour environment**

[ITC-irst] developed a tool for producing novel humorous expressions. From an application point of view the world of advertisement has a great potential for the adoption of computational humor. The tool is meant to be used as an aiding tool in the creative process of copywriters, suggesting humorous expressions to be selected by the human agent. The result can be used for monodirectional mass communication. It can be used for advertising on the internet and if combined with an ECA or Kinetic Typography it can provide a dynamic element to stress graphically the emotional content of the message. The tool for humorous expressions is particularly suitable for producing a high rate of potential messages, which can be targeted to specific groups, or novel situations where a rapid intervention can be useful. One specific potential case is the humorous variation on headlines, as a tool for semiautomatic but immediate production of an advertising message as a reaction to an event.

[ISTC Roma] The persuasive use of irony, humour, and ridicule has been studied in different contexts, among which political, judicial, and educational settings. Differential definitions of these devices have been provided and their multimodal cues have been singled out also in view of their simulation in persuasive agents.

[UT] realized a computer implementation that utilizes cross-reference ambiguity in utterances for simple conversational jokes. Using a simple script representation, it is shown that cross-reference ambiguities always satisfy the requirement of linguistic humor theories for script overlap.

### **False emotions in true lies**

[UA] Development of strategies for deciding on: (a) when to convey the felt emotion (b) when to convey a false emotion, and (c) when to let the original emotion leak through to allow the user to interpret the agent's behaviour appropriately. Integration and test of methods took place in the Gamble system.

### **Music for communication and persuasion**

[QUB] The driven study looked at the perceived emotional content in pop songs and how this is related to the songs' musical content. The study has been carried out in three stages. The first stage contains experiments using the FeelTrace device to record the perceived emotional content. On the second stage, the emotional content described by the subjects is correlated with descriptions of the songs' musical content. On a third level, it is envisaged a computational system to be built to reflect the results and make predictions for the emotional content of new songs. The developed prototype aims at selecting the appropriate music to accompany a persuasive message. Given that it can produce tailored music, it can be used for personal and homogeneous groups communication. It can be embedded both on fixed and portable devices. It can be used for advertising on the internet. This prototype is particularly

suitable for the communication strategy step of a promotion campaign on the “how to say” side. In fact it is well known that in TV ads one of the key aspects is the selection of a suitable melody/jingle to enhance the persuasive impact of the message.

## Main achievements (Element 3)

### Computational emotive and persuasive language resources

[ITC-Irst] The aim of the research was to explore statistical acquisition techniques for Persuasive NLG in an unrestricted domain. In order to perform statistical acquisition persuasive text resources were collected.

(a) *A Corpus of tagged Political Speeches (CORPS), as examples of long and articulated texts.* In collecting CORPS, the hypothesis that tags (such as “applause”) are indicators of hot-spots, where persuasion attempts succeeded, was formulated. By relying on this hypothesis specific analysis - and extraction – of persuasive linguistic material that is preceding the persuasive hot-spot has been performed. Moreover, the approach made reference to different typologies of persuasive communication (according to the reaction induced in the audience):

- Positive-Focus: indicates a persuasive attempt that sets a positive focus in the audience.
- Negative-Focus: indicates a persuasive attempt to set a negative focus in the audience.
- Ironical: indicates the use of ironical devices in persuasion.

Extraction of “persuasive words” was done by using a weighted tf-idf score. Four lists of words were created according to the group of tags they refer to.

(b) *A Corpus of labelled Slogan (SloGun), as examples of short, high impact, sentences.* SloGun is a database of slogans coming from different fields, mainly corporate advertisement, but also political, educational etc. At present there are ~1500 entries tagged with various information like domain and product information.

(c) *A resource of Ordered Vectors of Valenced Terms (OVVT), for specific tasks involving valence modification of existing texts.* OVVTs were developed from an affective lexical knowledge base (WordNet Affect) merged with SentiWordNet. The general task is text to text transformation by means of reasoning on the valence of words. The task is based on a term extraction approach: given a term in the text to be modified, the system accesses the OVVT containing that term and chooses the most appropriate term according to the envisaged valence shift. The approach was implemented in the Valentino prototype.

### Natural language generation and narration techniques

[University of Augsburg]: Development of machine learning techniques for automatic generation of emotional text based on large corpora. The learning process can inform a statistical model of language generation.

**Emotive textual expression processing**

[ITC-irst] developed a semantic similarity mechanism, acquired automatically from unlabeled large corpus, for measuring and producing evaluative (affective) Noun Phrases, related to a general input concept (e.g. given "university" -> "encouraging teaching").

**Emotive dialogue management**

[DI-BARI] worked on how the information state approach to dialogue simulation suits to management of affective persuasion dialogues.

[QUB] designed the Queen's Communicator dialogue system to explore ways in which affective states can be generated with, and adjusted to complement, dialogue acts – some of which may be persuasive or dissuasive in nature.

## WP8 Deliverables (all of these are available on the portal)

Del. no	Deliverable name	WP no.	Delivery due	Completed
D8a	Report on Basic Cues and Open Research Topics in Communication and Emotions			
D8b	Preliminary Plans for Exemplars - Communication & Persuasion			
D8c	Potential exemplars: communication & persuasion			
D8d	Proposal for exemplars and work towards them: Communication and Persuasion	8	23	24
D8e	Proceedings of workshop on Emotion in Communication & Persuasion	8	25	25
D8f	Mid-term report on communication & persuasion exemplar progress	8	35	35
D8g	Pre-completion report on exemplar			