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### Design for Transfer

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**Valiant Hearts: The Great War (2014)**

Valiant Hearts: The Great War is the story of 4 crossed destinies and a broken love in a world torn apart. Dive into a 2D animated comic book adventure, mixing exploration, action and puzzles. Lost in the middle of the trenches, play as each of the 4 strangers, relive the War and help a young German.

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## H5: Mobile Adaptive Therapeutic Tool In psycho-Education (M.A.T.T.I.E.).

Design principles for a persuasive application tailor-made for adolescents with a mild intellectual disability

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## Abstract

This paper introduces the conceptualization and development of an assistive technology focussing on social problem-solving skills, as an addition to the field of psycho-education. This assistive technology in the form of an application goes by the name of MATTIE, Dutch slang for 'friend' and an abbreviation for Mobile Adaptive Therapeutic Tool In psycho-Education. MATTIE was tailor-made and befitting for adolescents with a mild intellectual disability and their therapists. The application introduces a simulated facetime call by an actor that is in a social predicament wherein social decision-making is warranted. The patient is asked to advise in the presented dilemma, making a decision and is afterward confronted with the outcome. Important design choices in the workings of the application are the choice of actors alike the target audience enhancing the parasocial interaction, the presentation of cases outside of the therapeutic setting, empowerment, and self-efficacy of the patient through role reversal and an answering system befitting the information processing of the target audience. Furthermore, it gives therapists the opportunity to have valuable input for their sessions and an adaptive system that gives them the control over the cases that are presented to the patient, thus picking the content befitting the specific needs of the patient.

## Keywords

*Mobile-assisted Learning; Mild Intellectual Disability; Psycho-Education; Parasocial interaction, Persuasive Technology; Social adjustment; Self-efficacy; Social Innovation; Transfer*

## Background

In the Netherlands, a Mild Intellectual Disability (MID) is defined as an IQ between 50 and 85 and limitations in social adaptability [1]. One of the main differences between these adolescents with the general population is the way in which they encode and process social situations; i.e. social information processing [2]. The limitations within the social information-processing manifest in low inhibition and sensitivity as well as vulnerability towards portraying anti-social behavior [3]. Several studies [4,5,6,7,8] suggest that behavioral problems of adolescents with average intelligence are related to their social problem-solving skills. Furthermore, adolescents with learning problems display a shortage in alternative solutions to social problems [9]. This is confirmed through the attitudes towards social limits [10,11] of adolescents with a Mild Intellectual Disability. The social limits are defined as four response patterns

to social dilemmas; Adjustment, Limit-overstepping, Bargaining, and Withdrawal. In a social conflict, adolescents with MID show a bias towards using the full range of response patterns resulting in the prevalence of the choice for either limit-overstepping or withdrawal. Problems in social adjustment are further exasperated by difficulty in generalizing learned skills and concepts [12] problems with theory of mind or perspective taking [13,14,15,16], i.e. the ability to see the world through the eyes of someone else. These limited social cognitive skills combined with a multitude of social contexts, lead to a contextual problem, i.e., using the social decision making that fits the specific social context or situation.

The current form of therapy that amongst other subjects encompasses this is psycho-education. Bäuml and Pitschel-Walz defined psycho-education as 'systematic, structured, didactic information on the illness and its treatment, including integrating emotional aspects in order to enable patients – as well as family members – to cope with the illness', in this case, MID [17]. The effect of psycho-education on the population with MID is relatively unknown [12] mixed effects were found [18,19].

In studying existing psycho-educational material the appearance of the materials do not differ from conventional methods in regular education and therefore the effect can presumably largely be attributed to the skills of the person conveying that message, rather than the material itself. The form in which psychoeducation currently takes place also seem to deviate from the six key principles found by De Wit et al. [12] leading to a successful intervention for the target audience;

1. Extensive assessment
2. Adapt to their level of communication
3. Make the practice or exercise material concrete
4. Structure and simplify
5. Social network and generalization of skills
6. Create a safe and positive learning environment

The specific needs of adolescents with MID legislates reaching out for alternate approaches, especially on the terrain of appearance and transfer. The role of the therapists and the way and form psycho-educational content is brought across largely determines the way in which it will be perceived.

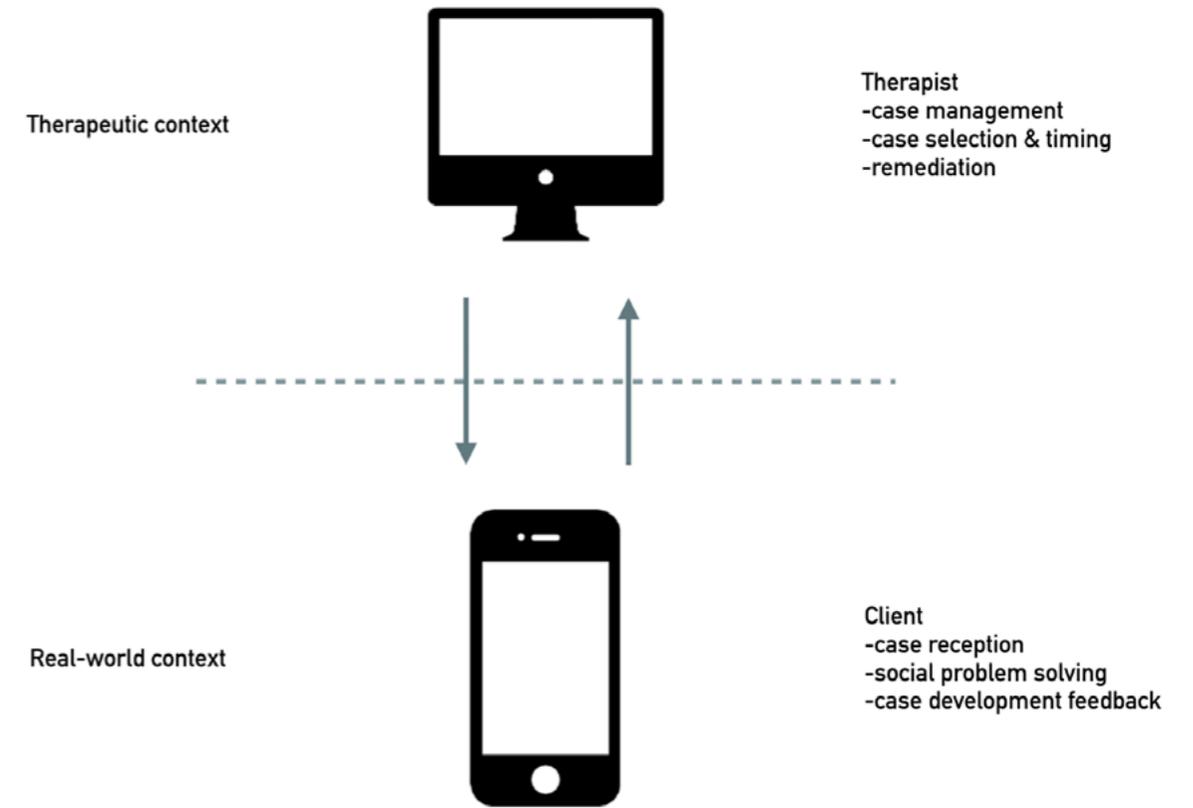
To fully utilize the strengths of the patient as well as the therapist, serious media can play an instrumental role and transform the healthcare setting through social innovation. This paper presents the design process of an application, designed to aid the resolve to conflicts in social situations experienced by adolescents with a Mild Intellectual Disability, from this point on referred to as the patient, and the remediation of their social adaptability by their therapists.

The Mobile Adaptive Therapeutic Tool In psycho-Education (MATTIE) is a mobile application hosting videos with short, realistic cases with topics familiar to adolescents, dealing with social situations which require social problem-solving skills. These social situations are recontextualized in separate cases, presented as facetime calls. Each video is played out by an actor with strong similarity to the patients. After presenting a social dilemma, two possible solutions are suggested by the avatar. These options are two out of four optional response patterns to social dilemmas [10,11]. To strengthen and reinforce the social adaptability of the patient; a) the application gives feedback on the outcome of the decision made for the virtual character and; b) the therapist reiterates the decision making process and the motivations behind it at a later time. A back-end database system, operated

from the therapeutic setting by the therapist, gives control over the timing and the content of the video cases presented to the patient, giving the therapist access to the patients decision making outside the therapeutic setting. The therapist is able to prompt a case with specific content on a desired moment in time to the mobile device via MATTIE to the patient. Cases can be selected by theme or optional social response patterns. Carefully selected and well-timed cases form a psycho-educational stimulus, triggers self-awareness, places relevant topics top-of-mind and create a precedent for transfer to take place. This makes MATTIE a powerful instrument to intervene in place and time in the real-world context of the patient.

As a starting point, the functional triad [20] was used in thinking about the use and application of persuasive technology. Persuasive technology is defined as technology that is designed to change attitudes or behaviors of the users through persuasion and social influence. Fogg [21] mentioned three layers of persuasive principles that can be embedded in interactive technologies: tools, medium and social actors. They form a functional triad in media technology, each or all-together triggering basic ways that people respond to computing technologies. As a tool, media can make it easier to realize

Figure 1: Schematic overview of the procedural application flow of MATTIE.



certain behavior, e.g., by offering structure or guidance in decision-making. Functioning as media, interactive technologies can use both interactivity and narrative to create persuasive experiences that support rehearsing a behavior, empathizing or exploring causal relationships. Finally, interactive technologies can function as a social actor, cueing social responses through their use of

language, assumption of established social roles or even physical presence.

Because MATTIE is an application that was tailor-made for the target audience and their therapists, design choices based on several theoretical constructs were made.

## Design Choice 1: Design for Transfer

Traditionally, transfer of learning [22,23] is often defined as applying what one has learned in one situation to another situation. Unusual and unwanted disruptive behavior in terms of choices, aptitudes or interests, often occurs away from the therapeutic environment. Thinking about transfer issues, the ideas on influencing the patient in a real-world setting seems promising. Using modern mobile technology makes it possible to position the psycho-educational content from the therapeutic setting into the real world, placing it right there where you want it to come into effect. Regarding the mental capabilities of the patient a low-road transfer [24] variance is in place. One of the key issues in learning is the difficulty the patient encounters when being in complex social situations involving decision-making and applies lessons learned from an earlier context into a new one. We try to bridge this transfer problem by instigating a near transfer approach by design, whereby it's crucial to be spot on regarding tone of voice, design, and content since the intervention takes place in their world. Authenticity and realism seem key in this interaction, so a strong focus on design seems just. Design choices have to be made carefully and be serving to transfer.

## Design Choice 2: Creating Parasocial Interaction

The form and way in which a message is presented largely determine the way in which it will be perceived. In case of a particular target audience, the form should also amend to the specific social information processing of people with MID. An important issue in the design of MATTIE was to ensure and optimize parasocial interaction [25]; the social interaction and potential for bonding between media user (patient) and media figure (virtual character). By introducing video cases, showing non-abstract, real characters in a way an actual facetime call would appear on a mobile device, abstractions that would forego the mental capabilities of the adolescents with MID are averted. Thereby MATTIE is able to avoid any hint of a psycho-educational instrument, instigating parasocial interaction (PSI). Providing an indubitable relation between the MID and MATTIE maximizes authentic and uninhibited responding. Finally, trustingly providing the adolescents with a modern mobile device generates an easy commitment.

## Design Choice 3: Empowerment & Self-efficacy through Role Reversal

Since MATTIE enters the realm of the patient; some precaution has to be taken into account. One of the most important factors is the establishment of the aforementioned PSI. As a token of respect and being deliberately modest about the influence MATTIE claims to have in the non-therapeutic setting, a non-directive and casual delivery system is needed. To make the mobile intervention valuable and authentic at the same time, the patient is hailed for help, instead of telling the patient what to do or not to do in specific situations. This is a role reversal from the established order in the therapeutic environment where the patient is the advisee instead of the adviser. This naturally empowers the patient, placing emphasis on the value of the patients' capabilities and trust in one's competence to give just advice. This empowerment will hypothetically influence the belief of the patient in his or her own ability to succeed in specific situations, enhancing the patients' self-efficacy [26]. Furthermore, the role reversal naturally forces perspective taking and leaves room for experimentation

in self-representation, without any "real" consequences. The video call shows a boy or a girl of similar age, background and social status, with whom the patient identifies and who is likely to influence the person's beliefs and behavior. Every presented case sketches a realistic dilemma, always ending with this one, same question: what would you do?

## Design Choice 4: Feedback and Remediation

When the patient makes a choice in assistance to the media figure on film, it is deemed important that the potential consequences of that advice are revealed. Case development feedback is presented in a short video fragment, simulating the outcome of the case-bound advice followed by the avatar. Depending on the case, feedback appears realistically timed within minutes or even hours after the advice given. Confronting the patient with consequences of the advice provides a natural and value-free stimulus for rethinking the case and the patients' role herein. In the real-world context the patient experiences control over situations, freedom in social decision-making, wherein the therapeutic context offers a safe environment for evaluating outcomes

with therapists. By remediating the processed social decisions, retrieving details on the context they were made in and seeking after social cues to increase self-efficacy of the patient, the therapist can use MATTIE as an effective therapeutic tool, offering new leads for psycho-education.

## Design Choice 5: Use of MATTIE outside of the Therapeutic setting

Though a person's cognitive limitations have a large part in decision making, the environment wherein a person is when making a decision also influences the decision making, i.e. bounded rationality [27,28]. The therapeutic setting is a structured, relatively safe, environment wherein the patient is free from the temptations of the outside world. The outside world is often; a) unstructured, because relatives often have the same mild intellectual disability and; b) unsafe, because peers can easily coerce the patient to display antisocial behavior. This disconnect between the therapeutic environment and the outside world leads to social desirable answers in the therapeutic setting that are not necessarily a reflection of the behavior in the real-world context. Therefore MATTIE prompts and presents its

cases in the real world context inoculating response patterns that deviate from the social desirable answers given in the safe and structured therapeutic environment. This gives therapists the opportunity to go beyond the given response patterns and use the situation the patient was in whilst he or she was responding in the therapeutic session. Prompting cases in the real-world context thereby provides therapist useful insights in the social response patterns outside of the therapeutic setting.

## Preliminary Results

A small trial was conducted with the prototype of the application. The patients (n=8) were given a mobile device (iPod) with the MATTIE application readily installed. Each of them signed a waiver, promising to take care of the mobile device, solely use it for MATTIE and returning it after a week. Up-front the therapists (n=5) supported by the development team, programmed the cases using the back-end database system, adjusted to the patient's agenda for a week. After a week non-directive interviews were conducted with the patients and the therapists. From both parties, the first findings were promising at least. The patients were sorry to hand in the device in the first place. More important was the collective notion of experienced bonding to the avatar. In differ-

ent ways, the patients mentioned an active engagement with the presented dilemmas and a curiosity about the well-being and outcome of the cases. One patient spoke about amity towards the avatar. The test group seemed without exception positive about carrying the mobile device, knowingly a simulated call could emerge. Three mentions were made about a sensation of restlessness when waiting for a new case to be prompted.

The therapists were clear in their findings: MATTIE bridges a gap between the patients' world and the therapeutic environment. In particular, the willingness of their patients to talk about the presented cases and the effects of given advice stood out. The real value was found in the acquired leverage to make personal topics discussable through the video cases.

## Discussion

With the heretofore-mentioned characteristics of the target audience in mind, a series of desirable specifications for the multimedia application was put together, based on the current state of the literature on mild intellectual disability and educational technology. Persuasive design was used to attempt to create an intervention that is tailor-made assistive technology for the target audience as well as an adaptive therapeutic tool for the therapist. The application was

designed to foster transfer, PSI as well as enhance self-efficacy and empowerment through role reversal and experimentation in self-representation. The result was a product that is a serious therapeutic; i.e. an application that operates on a trade-off between control of parameters by the therapist whilst acting as an assistive aid for the patient. Preliminary results are promising but further research is needed.

## Future Work

Novelty provides the initial motivation for the target group to engage with MATTIE. Since they use the mobile tool in their own time and space, it's important to think about therapy adherence and establishing a sustainable parasocial relationship. Gamification uses the engaging elements of gameplay, renown for its strong motivational characteristics.

To bridge the novelty effect and create acceptance into by the healthcare sector, rigorous testing will have to take place. In order to establish the application as an evidence-based intervention, within the psycho-educational curriculum, further research on the applications influence on self-efficacy, PSI and attitudes towards social limits will have to take place.

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