

Research Paper

A Versatile Experimental Platform to Support Context-Based Research in the Socialisation Process of Individuals with Eating Disorders

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Abstract: The Center for Human Excellence and Development (CHED), established by Taylor's University, Malaysia, contains a social behavioural research platform that is equipped with facilities to capture and analyse emotions during real-time interactions. The versatile observational room which is linked to analytics software can be customised into diverse social settings to simulate naturalistic interactions of individuals and groups. This is an initiative to increase the ecological validity of research findings. The observational platform critically allows for the recreation of normal settings and interactions where data capture of emotions can be done in the context of all the individuals involved in the encounter. The proprietary software developed analyses facial emotional micro expressions and currently identifies seven distinct emotions. This is done in a non-invasive manner and the system is able to simultaneously analyse the emotions of multiple individuals in the interaction. The artificial intelligence of this software enables machine learning to improve the accuracy of emotion identification. Developed to mirror the OVALIE experimental platform located in Toulouse, France, the platform is equipped with a flexible setting to enable the execution of innovative research on emotions and social events, supported by recordings and analysis of the emotions. This socio-behavioural platform enhances research in the areas of social sciences with scientific, reliable and valid analysis, increasing the generalisability of findings. Interdisciplinary research that can be facilitated by this platform is further illustrated by the on-going investigation.

Keywords: Experimental platform, eating disorders

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Introduction

Emotion is a fundamental research area of social sciences (e.g., Scherer, 2004) due to its capacity to alter socio-emotional experiences and memory (e.g., Petty & Cacioppo, 1986). Despite the advancement of the literature, research on emotion has inherited the same methodological flaw, resulting from the reliance on self-reporting measures, as the measured emotions may be the result of individual differences in language, instead of reflecting actual feelings (e.g., Barrett, 2004). Grounded on the latest advancements of information technology, innovative methodologies could address this shortcoming. One feasible solution is using software to initiate facial expression-based emotion recognition, which deciphers emotions from the facial features of the observed participants (e.g., Nonis et al., 2020).

Research on human behaviour and emotions during interactions have historically been limited to single-frame photographs of interactions and a limited number of individuals in the interaction. The ability to track micro emotions and their fluctuations in emotional responses to situations has recently been made possible through facial recognition and emotional tracking software. Dynamic tracking from multiple angles and in interactions of numerous individuals, however, needs to be supported by behavioural analytics software that is able to capture and analyse these emotional responses. More so, if the behaviour tracked is related to interactions of families and friends around food-related activities, involving individuals with challenging disorders or behavioural challenges.

Taylor's University's Center for Human Excellence and Development (CHED) is a social behavioural laboratory equipped with the facilities to capture and analyse emotions. The versatile observational room can be customised into diverse social settings (e.g., restaurant, day care center, classroom, therapy room) to simulate the natural settings of the studied sample. This is an initiative to increase the ecological validity of research findings. The observational platform critically allows for the recreation of normal settings and interactions where data capture of emotions can be done in the context of all the individuals involved in the encounter. Data captured in this laboratory, mainly emotions that occur as results of specific interactions, are processed by a proprietary data analytic software that can identify neutral features and seven basic emotions. This software is calibrated to Asian faces and the corresponding facial features. The artificial intelligence of this software enables machine learning to improve the accuracy of emotion identification. The facial features of a participant

will be captured by cameras installed at strategic angles in the laboratory. The data captured will be then analysed by the facial recognition software to decipher the underlying emotions in the interactions. This system will capture and convert the facial and emotional data simulated from a customised setting into the form of visual videos as well as numerical data, which will be further translated into data for analytics and machine learning. This platform¹ was designed as an extension of the OVALIE experimental platform located in Toulouse, France, which was developed with the primary aim of studying the influences of specific physical and social contexts on eating behaviours (Poulain & Simoulin, 2016).

Due to its capacity to replicate different social settings, the socio-behavioural platform in Malaysia can be utilised by researchers from different research fields (e.g., psychology, sociology, criminology, business, market research ethnography, sensory evaluation, etc.). For instance, in the food socialisation studies of individuals with special needs, their interactions with family members may be captured realistically. Thus, this platform can be a valuable resource to stimulate the progression of social science research. It can be utilised to improve the identification of dishonesty and lying, which has meaningful implications to relevant policymakers. Additionally, business interactions and decision making in an interaction can be tracked to identify the points of connection between emotions and cognition processes in influencing decision.

Utilisation of the Lab in Socio-Behavioural Research

The following is an example of a multi-disciplinary research that can be pursued using CHED: food socialisation and the management of eating behaviour of children diagnosed with the Prader-Willi Syndrome² and more broadly, the autism spectrum disorder. The challenges faced by children with autism spectrum disorder and their families during meal times may provide valuable insights to formulate and conceptualise interventions to support affected individuals. Although autism

¹ The development of the platform was supported by the expertise of Jean-Pierre Poulain, Cyrille Laporte and Joël Courant.

² This study is a part of the Hubert Curien Partnership France-Malaysia Hibiscus (PHC Hibiscus) Grant titled "The socialization of eating practices in children with Prader-Willi syndrome" (MYPAIR/1/2020/SS05/TAYLOR/1), which is a mirror study of "Socialisation des Pratiques alimentaires des Enfants avec un Syndrome Prader-Willi" (SoPAP – translation Socialisation of Food Practices of Children with Prader-Willi Syndrome). The interdisciplinary SoPAP project was conceptualised by food sociologists, Dr Amandine Rochedy & Prof Jean-Pierre Poulain conjointly with researchers of Toulouse Reference Center for Prader Willi Syndrome, Dr Marion Valette and Prof Maïthé Tauber. It received funds from the French Association for Prader-Willi Syndrome (2019) and grants from the Foundation of Rare Diseases in the frame of "Social Sciences and Humanities and Rare Diseases" call for tender (2020-2022).

spectrum disorder is well understood, Western-based interventions may be irrelevant to individuals residing in Eastern countries, as the expression of autistic traits is less salient in Eastern countries that emphasise connectedness or collectivity (Freeth, Sheppard, Ramachandran, & Milne, 2013). In a tightly knitted community such as Malaysia, it is crucial to consider the stability of the caregivers' psychological state (Bhagat, Simbak, & Haque, 2015). In this light, CHED can simultaneously collect and analyse data from children with autism spectrum disorder and their caregivers to address this unique research need.

This platform can be fundamental in extending the understanding on food socialisation, in particular, the specific dining experiences and the complex processes of food socialisation. As demonstrated by the Malaysian Food Barometer (MFB), food habits of Malaysians are mainly characterised by a high rate of eating out (Fournier et al., 2016; Poulain et al., 2020), implying a public eating situation (Julier, 2013; Mognard, 2019; Murcott, 2019). Secondly, the structure of a Malaysian household encapsulates several generations, indicating a shared space for dining in. The current literature is framed by polarised views on the degree of collectivity; western values tend to emphasise individual autonomy and choice, whereas Asian societies tend to value intergenerational exchange and family filial responsibility (Lou & Chi, 2012). Hence, there are important social expectations and practices towards the involvement of grandparents in the socialisation process of the grandchildren (van Willigen & Lewis, 2006). Finally, the employment of domestic helpers is common in various households. According to the Malaysian Maid Employers' Association (MAMA), there were about 250,000 registered domestic helpers in Malaysia in 2017. The involvement of domestic helpers in child-rearing and food-related activities (Alem, 2018) stimulate other types of social interactions in the socialisation process of a Malaysian family.

Although the medical field increasingly acknowledges the importance of family in the diagnosis and execution of daily care, the understanding on daily practices in a different setting is underdeveloped. To illustrate, in order to enhance the effectiveness of medical intervention of children with autism spectrum disorder, Bhagat et al. (2015) recommended to focus on the psychological mindedness of the parents. This involves an understanding of the relationship between parents as well as the emotional and stress management of parents, as these are factors that have significant impact on the effectiveness of autism spectrum disorder interventions. Bhagat et al. (2015) also stated that parents who perceived a lack of support in managing their children, experienced higher stress and aggression levels, higher divorce rates, and marital dissatisfaction, and high levels of caregiver fatigue.

Researchers in Taylor's University may propose projects to address these gaps by deepening the understanding of food socialisation of children and adolescents with autism spectrum disorder. CHED and its facilities will allow researchers to observe

complex social interactions in a simulated social setting. In particular, it is practically possible to observe the process of food socialisation of a family with a child with autism spectrum disorder, and this observation will include every member of the family. The installed programme will decipher the underlying emotions that occur throughout the observation period. Given the complex task of managing food and interactions, the “experiential knowledge” of these families potentially constitutes a source of rich data that could contribute to the development of a robust learning system that prioritises special needs. Essentially, this research area highlights the potential for a multi-disciplinary research and network building in the fields of medicine, sociology, education, and psychology.

Methodology and the Centre for Excellence and Human Development

Considering the complexity of the influences of emotions, observations of interactions that occur amongst individuals in a particular social setting is crucial to advance the scientific literature. The reliability and validity of observational research is enhanced with the application of technology that can identify and capture micro-expressions, in a consistent manner. This methodology allows for non-invasive monitoring of expressed emotions in a variety of situations.

The establishment of this research platform allows researchers to adopt the qualitative approach that focuses on forming meanings, and the corresponding subjective values are interpreted from the perspectives of these individuals, as well as the perspectives from the broader societal viewpoint (Jegathesan, 2019). The platform will also enable researchers to observe items such as the gradual emotional adjustments made over time during the course of the dining experiences as participants respond to various challenges. The customisable venue setting allows researchers to manipulate certain conditions in a social setting, which is a prerequisite of an experiment, with the purpose of stimulating different social settings. The efficiency of CHED lies in its capacity to generate experiential knowledge, utilising information gained from personal and interpersonal experiences (empowerment, treatment response, etc.), and from different social contexts — among others, care provided by professionals, accessibility and continuity of services, social exclusion — simultaneously (Onken, Craig, Ridgway, Ralph, & Cook, 2007).

Research Challenges via the Next Gen Socio-Behavioural Platform

The socio-behavioural observational platform in CHED realistically captures facial cues within a specific social context. While the potential advantages of the platform are clear, there are considerations that must be addressed with regard to the facial and emotion recognition technology. There are additional ethical and security concerns to be taken into account as well. Security and access to videos are key issues that

have been addressed by ensuring strict access to these facilities and strict monitoring on data extraction. Local and international laws pertaining to big data on facial recognition, individual privacy acts and protection, as well as confidentiality of participants, are issues that should be considered by interested researchers.

A final challenge is the acceptance and willingness to use new technology in behavioural research. The major challenge of utilising this platform is the complexity of the software, requiring a certain level of reskilling and technical competence in customising the system to suit the research parameters. Researchers are required to align their competencies with emerging technologies, as the capacity of this software will be upgraded through machine learning. Given the competitive needs in the areas of research and the push to support behavioural research with hard science and not just self-report and observations, the wave of technology-based research provides promising assistance in data collection and analysis, that requires researchers to adapt to these systems.

Conclusion

Since emotion is related to socio-emotional experiences and memory, it is a fundamental research direction for social sciences. However, most of the research on emotions relies on self-report measures. The latest advancements of information technology such as facial expression-based emotion recognition, enables methodological innovations aiming to complement this flow of data. This is the avenue taken at the recently launched socio-behavioural research platform at Taylor's University, Malaysia. Developed to mirror the OVALIE experimental platform located in Toulouse, France, the platform is equipped with a flexible setting to enable the execution of innovative research on emotions, social, supported by recordings and analysis of the emotions. This socio-behavioural platform enhances research in the areas of social sciences with scientific, reliable, and valid analysis, increasing the generalisability of findings.

Interdisciplinary research that can be facilitated by this platform is further illustrated by the ongoing investigation of the food socialisation process and the management of eating behaviour of children diagnosed with autism spectrum disorder (Rochedy, 2018; Rochedy, Raynaud, Maffre & Poulain, 2020). The methodology of the project includes the use of the platform as a complement to classic means of data collection in social psychology and food sociology. It is expected that the platform will support further understanding of food socialisation, in particular, the specific dining experiences in Malaysia where the diversity of interactions is increased due to multi-generational households and the presence of live-in domestic caregivers in day-to-day life.

Finally, the paper discussed the foreseen technical, security and ethical challenges. The management of the platform suggests that interested researchers should

consider and comply to local and international laws pertaining to facial recognition, individual privacy acts and protection, as well as confidentiality of participants. Additionally, some technical assistance may be required to ease the challenge of the complexity of the facial expression-based emotion recognition software as well as the process of customising the settings and the interactions of the observed participants. Nonetheless, given the current shortcomings in research related to emotions and their centrality in social sciences, it is expected that the platform will be considered for the novelty of the flow of data enabled for multi- or interdisciplinary projects.

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