An Image-Based Approach to Measuring Human Values

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Abstract: This study aims to explore the potential of using a novel image-based approach to measuring individuals' human values. This could result in higher-quality measurements by circumventing the drawbacks of the text-based methods prone to social biases affecting the truthful interpretation of complex verbal constructions and a low respondent engagement due to lengthy interviews. A review of the academic literature on image-based research into human values is performed and validated by our own empirical research on a representative sample of the Latvian population to compare the results of our image-based approach with the text-based approach. Our findings suggest that currently, most image-based methodologies for measuring the values and motivations of individuals lack structure and verified application. There is no precise and widely accepted methodology. However, a well-developed image-based research methodology has the potential to fill in this gap. The results confirm that an individual's values can be identified and structured into a personal hierarchy by applying both text-based methods (asking respondents to evaluate written statements) and image-based methods (evaluation of selected images representing specific values). Our study employs a new image-based approach that seems to offer a more straightforward and more precise way of measuring values compared to the text-based approach.

Keywords: human values; personal values; individual motivation; measuring values; value research; image-based research

1. Introduction

Despite clichés such as "a picture is worth a thousand words" and "seeing is believing", the use of images in research has been somewhat limited, except for applications in individual psychology.

However, with the advancement of digital imaging and information and communications technologies, particularly the rise of social media, human behaviour is also changing. We have made a remarkable shift in our consumption of information towards communication through images. This shift towards the visual is transforming the way individuals around the world relate to each other, including the way we perceive and construct our sense of self [1]. Hence, businesses are exhibiting a growing interest in image-based research—primarily driven by marketing and recruitment professionals who envisage a vast arena of applications, including profiling consumers and employees to understand and even predict their behaviour. The intrinsic motivation behind choosing one product or employment opportunity over another becomes particularly interesting for business professionals. However, experience with image-based research methods is scarce, particularly when it comes to interpreting the motivations behind the decisions individuals make. Exploring complex motivational constructs in depth can be challenging, especially with text-based methods that leave too much open to interpretation. Therefore, we have developed and tested a prototype of the technology based on the selection and categorization of visual images that can be used to identify an individual's personal hierarchy of values and to explore the relationship between values, attitudes, circumstances, and behaviours. The following article describes the foundations of the technology and explains the findings of our image-based trial study. Our aim is to facilitate scientific discussion and the further

development of a universal methodology that offers a hands-on solution for image-based research into human motivation and values.

The paper and the study are integral parts of a broader research project, entitled "Development of Values-Based Skills to Increase the Quality of Human Capital", commenced in 2019–2022 with the objective of developing a novel instrument for linking human values with their skills for sustainable development of human capital. The instrument is set to be capable of assisting individuals, employers, education institutions and public authorities to develop and profit from the labour market and skills intelligence in real-time. It makes the assessment of skills and human values of an individual (commonly credited as "personal values" in literature) simple, fast and hands-on, applicable for the labour market actors.

For this purpose, the authors developed a novel instrument for measuring human values through image-based personality tests. The instrument deploys iterative algorithms that update the content of collages of images based on user-sourced images that had been highly evaluated by other users with the same value profile—i.e., scoring high in the same value group.

The study was performed from Q4 2019 to Q1 2020 in Latvia, surveying 3413 individuals of working age (18–64) in a nationally representative sample. The further development of the technology and fine-tuning of the instrument was performed during 2020–2022 with a broader scope of linking human values to their skills, which is beyond the scope of the current article.

The current study is therefore limited to the assessment of developing the initial library of images used to measure the values. During this study, we tested the following main hypotheses for the development of our instrument:

Hypothesis 1. *The choice of images is associated with the individual's chosen written value statements.*

Hypothesis 2. *Images for measuring values can be sourced from respondents.*

2. Personal Values behind Individual Motivation

What motivates humans to behave in one way or another? Motivation is a complex, subjective, and multi-layered process that takes place internally, making it challenging to study. Baumeister [2] emphasized that, despite impressive advances in our understanding of specific motivations, the areas of the application of this knowledge remain diverse and isolated and lack a universal framework to explain the motivation. There is mounting evidence that personal values lie at the core of everyone's motivational construct.

According to Allport [3], "personal values are the dominating force in life, and all of a person's activity is directed toward the realization of his values. And so the focus for understanding is the other's value orientation—or, we might say, his philosophy of life".

The study of an individual's human values, often called personal values, as a means of explaining human behaviour has a long track record. The first systematic attempts to provide a method of classification for human values took place over a century ago [4]. Spranger defined values as the "belief[s] upon which a man acts by preference" and categorized them into six basic dimensions (theoretical, economic, aesthetic, social, political, and religious). He suggested that a dominant value dimension can be attributed to the individual. Although Spranger saw these dimensions as pure, most people are likely to identify with a mixture of value dimensions.

Since then, many researchers have focused on interpreting values and their dynamics and exploring their impact on behaviour [5–9]. The study of values has grown into an interdisciplinary area of research that includes psychology, sociology, marketing, and education.

Milton Rokeach [5] defined values as "enduring beliefs that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence". Values are desirable trans-situational goals of variable

importance applied as broader guiding principles by a person or social entity [6,10]. They serve as criteria for judgments, preferences, choices, and decisions as they underlie our knowledge, beliefs, and attitudes [11] and serve as guiding principles in human life [10].

Values indirectly influence every decision an individual makes, mediated by his/her attitude towards the phenomena determined by those values. For instance, if an individual values 'care for family', this will drive subsequent life decisions. Hence, the purchases or career moves made by that individual will be based on the premise of taking good care of his/her family, i.e., making life choices that generate the most significant possible utility for the family. People are motivated to act in accordance with their values to maintain consistency between their beliefs and their actions [5]; this facilitates the feeling of having a fulfilled and balanced life. Other researchers have identified values as an essential factor in every individual's life goals, purchasing decisions [12,13], and work-related behaviour. Arieli and Tenne-Gazit [14] emphasize the role of personal values in decision-making in the work environment. Recent research findings support the idea that there is a correlation between personal values and innovative behaviour in the workplace [15,16]; discrepancies between an individual's personal values and their work environment can lead to job burnout [17] and declining job satisfaction [18].

While values are considered universal in their context and structure, individual behaviours are shaped by the interpersonal differentiation of values and by everyone's personal hierarchy of values [19]. All values impact us simultaneously; however, at the individual level, the importance of any one value can vary. We refer to an individual's set of personal values as their value profile—a personal values "fingerprint". This value profile forms over an individual's lifetime, influenced by a wide range of sociocultural factors and experiences, including social norms. Values are closely related to motivation—promoting or inhibiting certain activities. Therefore, knowledge of a person's value profile can help to explain that person's behaviour [19,20]. Another factor that can influence a person's value profile is an event, occasion, or experience—in other words, the specific circumstances in which a decision is made. For instance, assuming that "protecting my country from external threat" and "caring about my family" are equally important values for an individual under normal circumstances, that person's behaviour may change in reaction to an imminent threat of military aggression based on her personal value hierarchy at the given time. This would be reflected in the way she solves the dilemma: Do I choose to prioritize protecting my country as the best means of protecting my family, or do I prioritize family safety before defending my country?

Such a type of relationship among values, attitudes, occasions, and behaviours is shown in Figure 1 below, which is just one of the constructs explaining it.

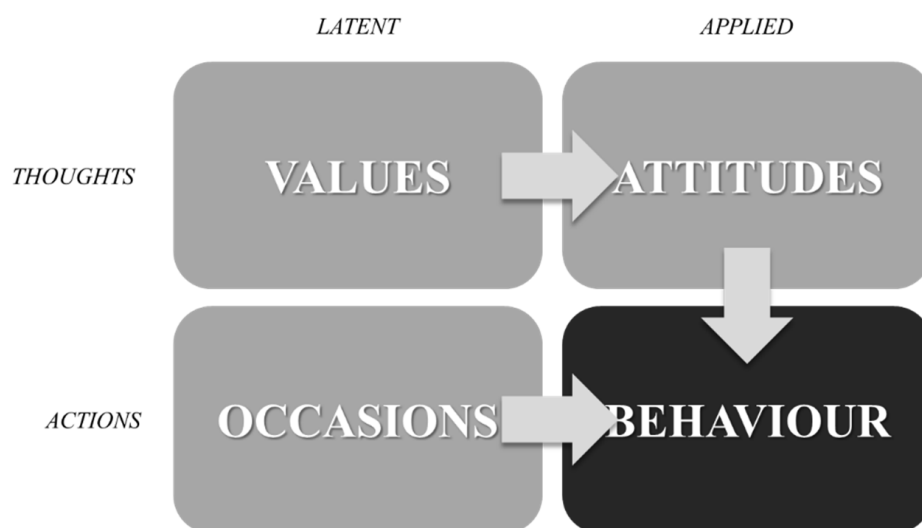



Figure 1. The impact of values on behaviour [21,22].

The illustration suggests that values are a latent motivating factor that manifests in behaviour through attitudes developed towards a given phenomenon. By identifying and measuring the impact of an individual's values hierarchy on their attitudes and choices, we can explain and even predict behaviour. There are numerous pieces of research, including the most recent, that exhibit a different impact, including the direct impact of values on behaviour; however, they all refer to values being an underlying factor behind the actual actions and behaviour of the individual [23–26].

3. Measuring Values

Many studies have now been carried out, mainly by psychologists and sociologists, to measure and interpret values using the work of Rokeach and Schwartz [5,6,10,11,19,20,27–29] as a starting point. The research thus far has empirically proven the universal context and structure of values across a multitude of geographic markets. However, the key challenge has always been identifying and measuring personal values due to their complexity and latent nature. Although many different instruments have been developed and applied over time, the most-used values classification systems and methodologies of measurement are complex and time-consuming to work with.

Vernon and Allport's study of values (SOV), developed in the 1930s, was among the first studies to propose instruments to measure values [30]. Their self-administered, self-scoring test based on Spranger's system provided an ipsative or forced-choice method for measuring the predominance of specific values in an individual. The results of the study proved the feasibility of this approach, suggesting that the tool could be applied to measure the prevalence of a specific value in each personality. This test was used for several decades in various fields such as sociological research, pedagogy, and occupational choice counselling. By the 1970s, it ranked among the top three non-projective personality tests in use at that time [31]. Several updates have since been implemented [32], and although the popularity of SOV has diminished, it is still considered a significant advancement that inspired the further development of values research. Advances and later approaches developed to measure human values have been one of the reasons affecting the diminishing popularity of SOV.

The Rokeach value survey (RVS) was among the first instruments to gain wide recognition in the 1970s, and it remains popular to this day. The RVS system defines two sets of values, each containing 18 individual items—"terminal values" that refer to desirable end-states (what the individual wants to achieve) and "instrumental values" that refer to preferable modes of behaviour employed to accomplish the terminal values [5]. Respondents go through both sets of values, arranging them by order of importance to them personally. While time-consuming and allowing respondents too much freedom in their interpretations of the possible meaning of individual values, this tool enabled marketers to segment consumers based on motivation as determined by the test. RVS was widely used and influenced researchers to develop other value measuring methods, such as the list of values (LOV) and values and lifestyle (VALS) tools, which also came to be widely used.

The LOV test [33] is a notable alternative that enabled marketers to classify individuals by taking into consideration Maslow's hierarchy of needs [34], thus facilitating a better alignment of the most important values with the typical roles of an individual in his/her life [35]. Another widely used system is VALS [36]. It became popular among many of the leading businesses in the United States performing consumer research due to the simplicity of the method, which enabled marketers to categorize individuals into nine lifestyle segments, each aligned with attitudes and demographic conditions.

Arguably, one of the most popular instruments is the Schwartz value inventory (SVI). Schwartz identified and validated 10 value domains or distinct value groups with a total of 56 or 57 values depending on the version of the instrument. The values are rated by survey respondents in order of importance to them personally. The domains represent either individualistic or collective values or a combination of the two. They are viewed in a framework of four dimensions—openness to change, self-enhancement, conservation, and

self-transcendence [6,10,27]. An updated and refined version [28,29] defines the goals for nineteen fundamental motivational values from the whole set (Table 1).

Table 1. Key motivational value types [28].

Value	Conceptual Definitions in Terms of Motivational Goals
Self-direction—thought	Freedom to cultivate one's own ideas and abilities
Self-direction—action	Freedom to determine one's own actions
Stimulation	Excitement, novelty, and change
Hedonism	Pleasure and sensuous gratification
Achievement	Success according to social standards
Power—dominance	Power through exercising control over people
Power—resources	Power through control of material and social resources
Face	Maintaining one's public image and avoiding humiliation
Security—personal	Safety in one's immediate environment
Security—societal	Safety and stability in the wider society
Tradition	Maintaining and preserving cultural, family or religious traditions
Conformity—rules	Compliance with rules, laws, and formal obligations
Conformity—interpersonal	Avoidance of upsetting or harming other people
Humility	Recognizing one's insignificance in the larger scheme of things
Universalism—nature	Preservation of the natural environment
Universalism—concern	Commitment to equality, justice and protection for all people
Universalism—tolerance	Acceptance and understanding of those who are different from oneself
Benevolence—caring	Devotion to the welfare of in-group members
Benevolence—dependability	Being a reliable and trustworthy member of the in-group

Consumer research has also adopted a values-based approach to understanding consumer motivation, albeit rather slowly, mostly applying such tests to real goods industries where the tangible attributes of the products in question make indirect measurement easier. However, similar research has been conducted in a wide variety of industries—from the automotive industry, where the choice of brand or car type has been explained by the influence of dominating values [37], to the fashion and apparel industries [38,39]—suggesting universality and repeatability. Values tests have been less frequently applied in the service industries; however, values research has been used by businesses in telecommunications, publishing, and insurance [21,22]. Values tests have also been used to define the dimensions for certain types of consumer segmentation [40].

The growing interest in values research is still limited by the fact that all instruments currently in use are time-consuming surveys based on respondents answering an extensive list of questions. This has several significant drawbacks:

1. The length of time necessary for respondents to complete the values survey translates into diminishing engagement and a lower quality of responses;
2. Text-based surveys that require respondents to evaluate the importance of values often contain semantically ambiguous statements that are subject to interpretation by respondents based on their level of education, personality, background, the context of the survey, and other situational factors;
3. Text-based statements regarding values bear the risk of being contaminated by social bias, as respondents may not answer openly and truthfully when evaluating values; they are deemed socially desirable but not so important to them and vice versa.

These drawbacks crucially diminish the quality of the research; therefore, we chose to investigate the possibility of enhancing the text-based methodologies that we had deployed before [21,22] with images associated with the values instead of questions or text-based statements.

4. Visual Images in Research

Visual representations play a significant and functional role in social–cognitive processes—images capture the attention of the individual and assist in judgement and decision-making because of their success in representing complicated concepts [41–43]. As demonstrated by numerous studies, images can convey an idea in greater detail with a greater likelihood of retention than the same concept expressed verbally [44–49]. Moreover, the recognition and processing of visual information occur much more quickly than textual information; familiar imagery is processed in 13–80 ms, and more complex (e.g., nature-related) images are processed in under 150 ms [50–52]. Neuroscientist Andrew Tate observed that we process images far more rapidly than text because when we consume visual data, the visual cortex interacts with almost half of the brain, causing cells to fire up to two billion times per second as the brain processes those visual stimuli [53]. The high speeds at which we process visual information is associated with the growing impact of the semiotic interpretation of images at a subconscious level in the Information Era, suggesting that visual information is recognized and processed thousands of times daily with little conscious awareness [54]. Other research supports the idea that the emotional context of images is processed automatically with no conscious awareness required, e.g., the interpretation of facial expressions [55,56]. Consequentially, visual images represent not only what they signify but also provide (meta) information about how a representation is communicated and received, i.e., how the symbolic meaning of an image is interpreted by the recipient, what that image symbolizes for the recipient, and what associations that person is likely to make.

From a semiotic perspective, visual images contain both denotive and connotative aspects [57] and convey cultural–experiential and sociocultural background codes relevant to the recipient. This aspect of visual communication is usually employed empirically by professional communicators to build a narrative that is relevant and persuasive to the target audience, encouraging individuals to engage in predetermined and desirable actions [58,59]. The connotative and sociocultural aspects are mainly related to the concept of personal values as they impact the formation of values during the individual's life.

With the advances in digital communications technologies, visual culture itself is another rapidly growing area, which is an increasingly important source for understanding both individual behaviour and the world at large. The study of visual media has been described variously as image-based research [60,61] or visual ethnography [62] and as the development of visual methodologies [63] and visual methods [64]. Jon Prosser wrote extensively about the emergence of visual methods in education with a particular focus on educational research [60]. As he notes, image-based research is more widely used in sociological studies than in educational research. It has provided significant contributions to our understanding of how dominant narratives can be questioned.

According to Prosser, interest in visual studies was snowballing already a few decades ago [60], resulting in a plethora of instruments for conducting image-based research and, as one would expect, divisions and disagreement as to what constitutes sound visual research. Moreover, visuality is making a growing contribution to the methodological practice of qualitative research [65]. Despite increasing acceptance of visual research approaches, the use of image-based methods remains emergent because of the lack of hands-on tools and technologies.

4.1. Visual Images in Educational Research

The learning process is the basis of the formation of the individual's personality, and, consequentially, the value profile is a particular area where the impact of visual culture is

viable—digital technologies provide us with many new tools for enhancing the learning processes, and images certainly are among them.

Moss [66] suggests that images and visual perception-related research methods play an essential role in the development of our understanding of the social construction of reality and in social science research more broadly; the use of images introduces many new options for personalizing curriculum. The ephemeral and "evocative objects" [67] that exist in classrooms and aid in the practice of teaching—artefacts such as maps, diagrams, PowerPoint presentations, performances, projections, memories, and poems that are "all creations of human culture, patterned and crafted to fulfil a function [...] or to communicate something" [68]—relay the normative discourses of curriculum production. Visual culture "is as a field of study and a set of ways of understanding these physical and social phenomena" [68].

Education research is another area in which image-based approaches have been long considered to have great potential to help us unlock the key to motivation. Shohel [69] notes that images can contain details of events, memories, emotions, and the meaning of facts. Images capture and store snapshots of events for future recall and make it easy to share this information with others. This suggests that mixed-method studies using complex interpretative and holistic images of our multi-layered social world can provide important insights into social or human problems. Despite the recognition of this potential, visual or image-based research methods have not taken hold [70]. According to Fischman, the "reliance on words and numbers among educational researchers and the general tendency of dismissing images is generalised across academic traditions, theoretical traditions, and research methods" [70].

Patrick Dillon et al. [71] at the University of Reading in the UK developed interactive, image-based instruments for investigating perceptions of environmental issues—understandings of, reactions to, and beliefs about environmental issues, particularly among student teachers. Their survey instrument was developed in response to the recognition that a respondent's reaction to the external environment as members of a social group, model citizens and, in some cases, as professionals, depends as much on one's beliefs and values as it does on one's knowledge and understanding of the environment [72,73].

Survey questions posed around images ask respondents to provide both "interpretational" and "judgmental" responses. They elicit information about respondents' understanding of, reactions to, and beliefs about a particular topic. Building on Kelly [74], psychologists in the field of personal construct theory describe these processes as "construing". Construing involves thinking, feeling, and reacting; it has cognitive, affective, and conative dimensions and thus provides a means of establishing how individuals experience the world and make sense of their experiences.

Harrison [75] suggests that visual research methods describe any research design that utilises visual evidence—images, things, etc. For Grady [76], an image can be entirely objective—a record of what occurred at a given moment—yet its interpretation is entirely subjective. In this sense, images generally represent complex subjective processes in an extraordinarily objective form. Deploying a research methodology that presents respondents with a series of images to react to, each of which fixes a particular moment in time and carries a universally accepted association, could be a way of overcoming the problem of ambiguous verbal/textual representations that leave meanings open to interpretation.

Oakland [77] evaluated how much the five senses contribute to the human learning process, suggesting that visual communication is more impactful for both the delivery and reception of information:

1. Sight (visible) 75 per cent;
2. Hearing (audible) 13 per cent;
3. Feeling (tactile) 6 per cent;
4. Smell (olfactory) 3 per cent; and
5. Taste (gustatory) 3 per cent.

Though it may be argued that visual messages are much better than words at capturing and conveying both contextual and emotional meanings, other research confirms the prevalence of the visual modality as well in recent studies, e.g., Taylor and Brewer [78] referring to a minimum of 60% of the population being driven by the visual first.

Furthermore, multiple authors highlight the superiority of pictorial elements compared to verbal elements [48,79–81], indicating that we are becoming a visual society [82] in which "we're losing our patience with words".

Carrying a semiotic context, visual images evoke a particular kind of response in recipients. Harrison [75] distinguishes between what people see in an image and what they may say about it. Visual images are unique in their representation of data and are much more impactful in communicating complex associations in a simple format while avoiding discrepancies in personal interpretations and the biases inherent in using a verbal approach; using an image-based method also reduces the time needed for testing in the complex field of values research, thus eliminating the risk that respondents grow tired and lose their sense of engagement.

4.2. Visual Images in Psychological Research

Visual methodologies are commonly used in psychology with the caveat that most of these methodologies are based on image sets that have been developed and used by the researchers or therapists themselves. This poses a particular risk of bias. Qualitative psychological research most often employs three distinct types of visual material [83]:

1. Pre-existing visual materials—visual products that come into being solely due to the research process and endure after (e.g., children's drawings);
2. Time-limited visual data—materials produced within the research process and constitute the data for the study (e.g., observations of individuals' actions);
3. Enduring visual products—pre-existing visual materials typically include images produced by others (e.g., gallery artworks or photos).

While an analysis of clinical methods is beyond the scope of this project, the third set of materials—enduring visual products—is like those used in image-based values tests.

For instance, one of the most frequently used methods of psychometric assessment today is one developed by the Nielsen Company, VisualDNA. It is a visual quiz that uses images (visual response options) to measure personality attributes. VisualDNA has managed to replace the traditional Likert scale with images that help to explore the big five dimensions of personality—openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. According to VisualDNA [84], their quizzes are based on images that deliberately trigger a rapid, emotional reaction from deep in a respondent's subconscious; they claim to deliver an 80% completion rate.

Anna Döring and her colleagues [85] developed the picture-based value survey for children (PBVS-C) assessment method to assess children's values and gather information on their cognitive–developmental backgrounds. This is probably the closest match to our project in the available literature. However, PBVS-C has been used to measure children's values in particular; and the pictures deployed in PBVS-C were specifically developed instead of using user-sourced content such as images or photos from different real-life life scenes, setups, and impressions. In our approach, we have opted exclusively for user-sourced images to eliminate the risk of the influence exerted by a subjective choice of images by the researchers. Similarly, Shohel [69] carried out a focus image survey with children. By using pictures in their surveys, interviewers managed to elicit much higher levels of interaction and more detailed answers during their interviews.

These two examples suggest that better results can be achieved by using image-based surveys when interviewing children or younger participants. Can we obtain similarly qualitative results from image-based surveys conducted with adults? This area has scarcely been explored, and our project is an attempt to fill the gap. The portrait values questionnaire [86] attempted to deploy a combination of text-based and image-based elements; however, it contains text statements, which might be considered a risk for social bias—we seek to close

this potential drawback as well by making our image-based and text-based surveys separate and by providing no hints regarding the context of images to the respondents whatsoever.

4.3. Research Limitations in Values Research

Contrary to the research conducted in the fields of education or psychology, the use of image-based research methodologies in such areas as marketing or recruiting is not described in the academic literature. Nevertheless, image-based interviews have been used successfully for cultural studies and have been employed across a wide variety of disciplines and topics. There is a limited number of research papers on the use of image-based research to evaluate personal values in marketing, recruiting, and other aspects of economics. The academic literature is mainly concerned with the use of visual materials in art, education, and psychology.

One continually contested topic is that of interpretation. As observed by van Leeuwen and Jewitt [87], diverse approaches are employed when collecting and analysing visual data. These authors highlight the fact that some methods of analysis are more methodological than others, outlining exact criteria for analysis and, in doing so, suggesting that a methodology for visual analysis can be followed in much the same way as a "step-by-step" recipe in a cookbook. How can visual studies researchers best represent visual data? This question is hotly debated in the field (for different modes of visual data representation, see Prosser and Loxley [88]). A critical aspect of this discussion centres on the relationship between image and text. Should visual data "speak for itself", leaving the interpretation of meaning to the audience? What are the best sources for test images? Do image surveys provide a higher degree of quality (completion rate, validity)? This is another question we explore in our study.

5. Measuring Values Based on Images: Our Approach and Findings

5.1. Methodology: The Context and Approach

The traditional way of measuring values is by asking respondents to react to written value statements, which is a common approach for the most popular instruments [5,6,10,27–29]. To research the possibility of using visual images to measure human values, authors created two sets of stimulus materials:

1. Thirty-two discrete images were chosen for use in the survey through a two-stage process. An initial set of sixty-four images was selected by the authors. This set was piloted with 300 respondents, who were asked to evaluate the likability of each image and take part in a value test based on written statements. Researchers (authors) compared correlations of image likability scores with the personal values of respondents. The thirty-two images having the highest absolute Spearman correlation scores were retained for this test.

2. Sixteen image collages were chosen for use in the survey through a similar multi-stage process. During previous studies, respondents who took part in value tests based on written statements were asked to provide the images they liked the most. Authors subsampled images only from respondents who have distinct personal values. Images from respondents with similar values were combined in one collage. Each collage contained more stimulus material, which increased the noise of single-image perception but also provided the context for the interpretation of images. The latter is the reason why authors opted for collages instead of a single image when all images were sourced from respondents only.

The questionnaire for testing stimulus materials consisted of four sequential steps:

(1) Evaluation of single images using a three-stage process. In the first stage, respondents were shown all 32 discrete images, four at a time. Each time they were asked, "Which of these images do you like best. Choose not more than two or the option 'none of these'". In the second stage, respondents were asked to limit the images they liked if the final number of selected images exceeded six. In the third stage, they evaluated

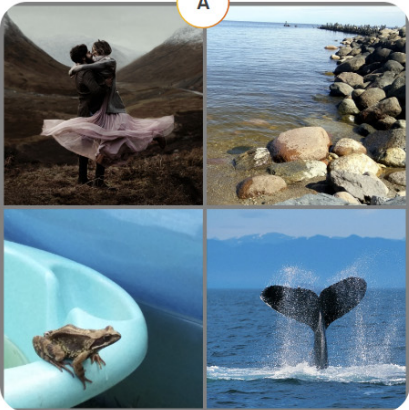
the likability of each of their chosen images using a scale—if they "like [the image] very much; like; rather like or not".

(2) Evaluation of collages of images. Respondents evaluated the likability of each of the collages of images by a question, "Which image series do you personally associate the most with an accomplished, fulfilled life—not just in moments of leisure but in everyday life as well?" and using a scale of "Like very much; Like; Rather like than dislike; Indifferent; Dislike; Dislike very much." Respondents were asked to select at least two collages most associated with an accomplished life by showing them a subset of all collages, which they evaluated with scores "Like very much" and "Like" (see sample collages in Figure 2).

Figure 2. Sample collages of user-sourced images (Latvia-specific sample) in the context of the survey in a web browser, English auto-translation of the system used for the illustration. All collages are generated by algorithms of the system from images uploaded by survey participants. The uploaded images are either (**A**) their personal photos with the rights of use for the purpose of the research transferred to authors by their informed consent to the Terms of the Study, or (**B**) selected by the participants from the randomly offered public stock photos under free to use or CC0 license terms with no attribution required.

(3) Uploading of 2–3 images they personally associate with a fulfilled, accomplished life to the system. They were informed about the copyright and privacy aspects; then were provided options of choosing their own images (e.g., photos made by them) and randomly selected several royalty-free image stocks (internet sites offering royalty-free images).

(4) Evaluation of written value statements (text-based test) using multi-stage value importance selection. In the first stage, the responders evaluated 64 value statements using the SVS approach and the scale if the respective values were personally considered to be "Very important value; Important value; Less important value; Indifferent value; Opposite to my values". In the second stage, respondents were asked to choose their most important values ("Please select which of these very important values are

the most important to you!"). If the respondent selected more than three values, the third selection stage was shown ("Please indicate the relative importance of these values—which of them are the three most important for you and which are the next most important").

The questionnaire contained quota questions (age, sex, region, language) at the beginning and demographic questions (education, occupation, profession, household size and structure, income) at the end. All respondents provided their informed consent for the data policies; the personal data used for the development of the instrument and any subsequential research steps were fully anonymised and EU GDPR-compliant. All stimulus materials were rotated from respondent to respondent.

The questionnaire was fielded in two versions to determine the impact of the sequence of text-based value questions and image-based value questions: in the first version sequence was as outlined above; in the second version, Section 4 (text-based test) was presented first, followed by Sections 1–3. The sequence in which images and collages were presented remained the same because a single image contains a smaller number of symbols and so comes first in the hierarchy of symbols.

Data were collected from a representative sample of the Latvian population aged 18–64, defined as the working age and limited for the purpose of linking it further to the context of relating the values to the skills available and sought by the labour market, which is a broader scope of research demanding the instrument. The survey was conducted Q4 2019–Q1 2020, and therefore this article considers a dataset limited to this period.

From a total of 3413 respondents, 2944 were selected for analysis. The rest were excluded as outliers for different reasons, including 205 who did not differentiate among values and scored them all equally important and 264 respondents who provided the sequence of value importance outside 99.9% of Mahalanobis distance metric distribution. All calculations were performed using IBM SPSS software (version 26).

5.2. Survey Results and Interpretation

The Pearson chi-square test determines whether categorical variables are independent of each other. If the test is significant, we reject the null hypothesis. We can conclude that the choice of visual images is associated with an individual's chosen written value statements. The written value statements can be replaced with images in value measurement surveys.

A Pearson chi-square test relies on the observed frequency of the metric in question. If the frequency in any cells is less than five, the result might be unreliable. Therefore, we used only those images and collages selected by at least 100 respondents. This process resulted in a final list of 28 images (of 32) and 11 collages and the group "Others" (comprising 16).

We sampled the top three most important values: "Being faithful to the immediate family", "Caring for your own health", and "Caring for the safety of your loved ones" (see details in Table 2).

Table 2. The Top 10 values from the initial list of 64 values.

Value Statement	% of Respondents Who Put This Statement among Their Top 3 Most Important Value Statements
Being faithful to the immediate family	35%
Caring for the safety of your loved ones	18%
Caring for your own health	17%
Dedicating oneself to family	8%
World peace and harmony	8%
Achieving inner harmony, peace of mind	8%
Keeping promises, being responsible for what you say	7%
Wealth, material prosperity	7%
Being honest with others	7%
A settled, balanced personal life	6%

The number of respondents acknowledging these values as being among their top three values varied between 507 and 1016, making them suitable for use in group analysis. These values were among the top three regardless of whether the text-based value question series was presented before or after image selection (image-based text).

These top values were tested against a selection of images and then against a selection of collages. The resulting chi-square values are summarized in Table 3.

Table 3. Results of choice independence test between written statements and images.

	Single Image Selection	**Collage of Images Selection**
Being faithful to the immediate family	Chi-square 91.448 df 28 Sig. 0.000 (1.176×10^{-8})	Chi-square 21.190 df 12 Sig. 0.048
Caring for the safety of your loved ones	Chi-square 48.567 df 28 Sig. 0.009	Chi-square 19.358 df 12 Sig. 0.080
Caring for your own health	Chi-square 87.531 df 28 Sig. 0.000 (4.7966×10^{-8})	Chi-square 24.685 df 12 Sig. 0.016

These results confirm that respondents' choices between values and images are not independent and follow a particular distribution. This suggests the possibility of developing instruments that can measure values for any individual using images or image collections.

Hypothesis 2 was tested by the authors by a parallel comparison of the results among the single images and collages. If the selection of collages was independent of the choice of values, the null hypothesis could not be rejected, and we shall conclude that images for measuring values can be sourced from respondents. Results from Table 3 suggest that in two out of three test cases, the selection of collages is associated with the choice of values leading to mixed results.

We used one sample test. Therefore, the sequence of test objects can impact the outcome. To evaluate the impact of sequence, we repeated the tests with two subsamples. One sample required respondents to select images before seeing written value statements (n = 2234; 75.9%), and the other required them to choose images after seeing written value statements (n = 710; 24.1%). The results are summarized in Table 4.

Table 4. Results of choice independence test between written statements and images considering the sequence of stimuli.

	Single Image Selection before Selecting Written Value Statements	**Single Image Selection after Selecting Written Value Statements**	**Image Collage Selection before Selecting Written Value Statements**	**Image Collage Selection after Selecting Written Value Statements**
Being faithful to the immediate family	Chi-square 68.917 df 28 Sig. 0.000	Chi-square 49.233 df 28 Sig. 0.008	Chi-square 16.010 df 12 Sig. 0.191	Chi-square 11.911 df 12 Sig. 0.453
Caring for the safety of your loved ones	Chi-square 32.595 df 28 Sig. 0.251	Chi-square 32.688 df 28 Sig. 0.247	Chi-square 11.444 df 12 Sig. 0.491	Chi-square 18.250 df 12 Sig. 0.108
Caring for your own health	Chi-square 91.471 df 28 Sig. 0.000	Chi-square 29.272 df 28 Sig. 0.399	Chi-square 19.635 df 12 Sig. 0.074	Chi-square 17.089 df 12 Sig. 0.146

Our results indicate that the order in which stimuli are presented does matter—asking respondents to evaluate the images after reading the written statements produced a poorer outcome. This may be due to the activation of different parts of the brain—differentiating

between written value statements is related to cognitive processing and effort while selecting images seems to require accessing the subconsciousness. After engaging cognitive processes to choose between written value statements, the respondent might be inclined to continue processing images in the same way, thus creating more "noise" or undesired external influence. As a collage of images contains a greater number of symbols, they are harder to be selected consciously (i.e., respondents deliberately attempting to interpret their meaning), thus yielding more stable results, as seen in Table 4.

Some words of caution: although the statistics show that respondents' choices of written values and collages are not random, it is also ambiguous. Tables 5 and 6 show the distribution of the image and collage choices by respondents selecting statements among their top three values.

Table 5. Percentage of respondents selecting representative statements among their top three values who also chose a particular (single) image as one of the most likeable (from four options).

	Image 7	Image 16	Image 3	Image 26	Image 28	Image 20	Image 13	Image 32	Image 18
Being faithful to the immediate family	35%	27%	24%	25%	20%	21%	20%	19%	17%
Caring for the safety of your loved ones	28%	32%	27%	21%	22%	20%	17%	16%	15%
Caring for your own health	36%	30%	26%	25%	22%	21%	21%	20%	19%

Table 6. Percentage of respondents selecting these statements among their top three values who also chose a specific collage as the most likeable (one choice was possible).

	Collage 4	Collage 3	Collage 1	Collage 7	Collage 15	Collage 9	Collage 16
Being faithful to the immediate family	18%	15%	15%	12%	10%	9%	9%
Caring for the safety of your loved ones	17%	16%	14%	9%	11%	10%	8%
Caring for your own health	21%	14%	14%	11%	9%	7%	9%

6. Discussion and Further Research Recommendations

Images can be used to determine an individual's human (personal) values. Images provided by individuals also can be used for this purpose. In both cases, the library of images and their selection procedure are essential. Even using pilot tests before shortlisted images were used in the study, we see that the choice is still ambiguous though not random. The sequence of stimuli does impact the results. In future research, we suggest showing image stimuli before text-based value statements.

In our study, we used the likability of images, which do not necessarily relate to values. For future research, we suggest changing the wording—for example, "Which of these images would you relate to an accomplished and valuable life for you personally?"

Later in 2020–2022, new datasets were built through consequential surveys with the purpose of assessing the potential impact of the pandemics; however, a significant impact has not been observed—though it may require more longitudinal research.

7. Conclusions

The results of this study confirm that individuals' underlying values can be measured using both text-based (written value statement selection) and image-based (image/collage selection) methods. Using collages of several images provides greater consistency, although at the expense of some precision. The key to success in using collages is a proper selection of images to be included in collages.

The wide spread of images and collages across any value statement might also raise discussion of which of these instruments are more precise and whether they measure the same underlying construct. One possibility may be that written value statements are more prone to individual interpretation due to self-perception (how one wants others to perceive him/her). Still, image selection that requires accessing the subconsciousness might provide results that are more closely aligned with the true self and less prone to variations within specific contexts.

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