

The Red Dot Experiment – Individual Response to Visual Stimulus

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ABSTRACT

Communication, even the most basic, is not perceived by all audiences in the same manner. This paper presents the 'Red Dot' experiment that involved 4700 respondents from UAE, India, Singapore, Hong Kong, China and Japan. They were shown the picture of a circle filled with red colour and asked what is the first thing that comes to mind. There were over 50 types of interpretations, ranging from simple (such as red dot and traffic light) to abstract (marriage and universe). The types of responses varied based on the region. For example, the most common interpretation was 'bindi' for those from India, 'evil' for respondents from UAE, and 'marriage' for those from South East Asia. The interpretation of the image also varied based on the speed of response, with early responses tending to be emotional and later responses tending to be logical in nature. The 'individualized experience' becomes a major factor when human beings process visual stimulus; in other words, what people perceive in their mind is beyond what they see with eyes. The study confirms that our cultural impressions combine with perceptual organisation to create unique responses to stimuli. This points to the need for caution in conveying specific messages to diverse audiences, to ensure that it is perceived correctly in the intended manner.

KEYWORDS

Perceptual psychology, learning, communication, cognition

REVIEWER REMARKS

The Red Dot Experiment has provided interesting findings of need for context in perception. This opens doors for considering context aware learnings and systems in education, health, social marketing and public policy. Traditional knowledge systems have relied on information alone, the present systems rely on experience based learning and the future systems will rely on context based learning. Cultural parameters cannot be denied and we need to move away from universal knowledge to contextual knowledge but universal wisdom. This work has potential to inform the future design work for better user experience and I strongly recommend these findings be disseminated.

Namrata Bagaria, MBBS, MPH (Harvard), PhD (C)
Founder, Health 4.0 Leadership Institute

"The 'Red Dot' is an interesting experiment that clearly demonstrates how cultural background influences our perception of visual stimuli. The wide range of responses to a simple picture (red dot) shows the importance of carefully planning visual communication to ensure they impart the intended message."

B. Ravi
Institute Chair Professor, Mechanical Engineering, IIT Bombay | BETIC | DS School of Entrepreneurship

The Red Dot Experiment will be referred to over the years to come as an eye-opening study - emphasising the need for evolved communication and sensitivity- across leadership, advertising and education. Preschool children learn bias, especially through nonverbal signals displayed by the ones they look up to - their parents and teachers. Vague off key political speeches cause candidates to lose elections. And the backlash of insensitive advertising is felt by brands for decades to come. With this study, Mrs Gupta has established her deep understanding of the impact of communication; in an era of information overload, she encourages us to consider the consequences of what we put out into the world.

Raghav Podar
Chairperson West Zone- FICCI Arise
Chairperson Podar Education

FOREWORD

This paper attempts to research the impact of how we perceive images and messages and is a documentation of the groundbreaking RED DOT Experiment.

As Business Leaders, Marketers and those who are responsible for communication, it is critical for us to understand the potential impact of the visuals and words we use and how they conjure up different reactions and evoke different emotions across the world in different communities, different social strata, varying religious ethnicities and across borders.

Through her research, Gupta emphasises the need to be sensitive to diverse audiences, their socio cultural context and the possible interpretation of the message bringing home the old age adage of 'We hear what we are conditioned to hear and we see what we want to see'.

How can we break these stereotypes to ensure that messages have the impact that we intend? This is particularly true for Business Leaders and Politicians who grapple with varying constituencies across borders.

For example, in the year 2000 during the US presidential elections; Al Gore let out heavy sighs during his debate against George W Bush. He might've been expressing his exasperation- but people thought it was downright condescending! Intended message was diametrically opposite to perceived reality.

I am certain this study will be a toolkit and guide for communication experts from across the world to quote the Red Dot experiment as they design their communication. Reeta Gupta, with her decades of experience in advocacy and public relations, has been able to bring the communication discipline to the next level through her research over the past 10 years.

Tarun Anand
Chairman
Universal Business School

INTRODUCTION

The human visual system leverages organisational regularities of perceptual elements to create meaningful representations of the world [1]. Studies have shown that mechanisms in the visual cortex help people to focus on what they want to see, rather than all there is to see [2 (Ed Callaway)]. The ability to perceive shape, patterns, and objects is not just a result of straightforward encoding of visual stimulus (feature analysis) but is also under the influence of top-down processes. This top-down influence is known as perceptual set, and is the effect of an individual's unique experiences on her expectations of the world [3]. This is why we are exceptionally good at filling in the blanks in an image and creating a whole that is greater than the sum of its parts [4 (Max Wertheimer)], for example, seeing faces in the sky or interpreting blank spaces in an image.

There are several approaches to analysing 'how we see what we see'. Anatomical studies look at neural wiring inside the brain [Ref]. Physiological studies determine how individual cells and groups of cells react when a particular segment of the visual field is presented with a certain type of stimulus [Ref]. The optic nerves (each comprising a million fibres) convey signals from the retinas to the visual area of the thalamus, a part of the brain that functions as a relay station for sensory messages arriving from all parts of the body (Fig.1). From there the signals proceed to the primary visual cortex. Scientists believe that from here, they branch out to a series of other, higher centres [Ref]. Subsequent transformations of the signals lead to the recognition of forms and movements, based on the way neurons encode objects [Ref]. The average reaction time is 0.25 seconds to a visual stimulus, 0.17 for an audio stimulus, and 0.15 seconds for a touch stimulus [6]. Among colours, red carries the strongest reaction, decreasing gradually with orange, yellow and white [5].

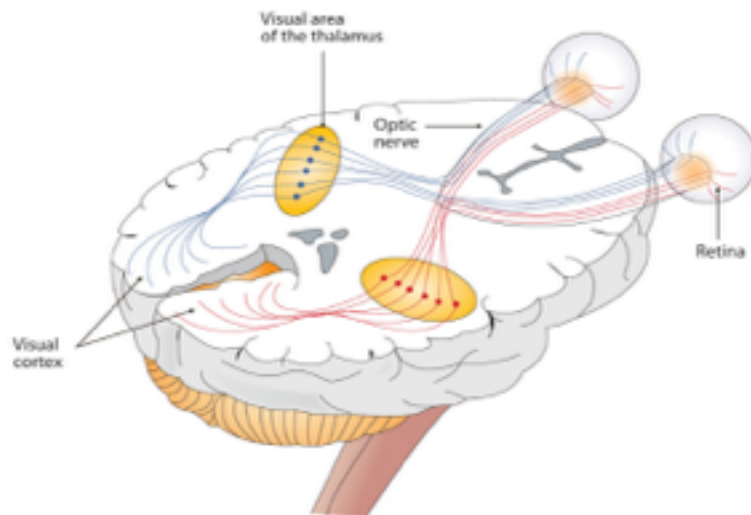





Fig. 1: Human visual system [opentextbc.ca/introductiontopsychology/chapter/4-2-seeing/]

In addition to the mechanical process of vision outlined above, 'making sense of what we see' is a perceptual process. One of the important processes required in vision is the **perception of form**.

German psychologists in the 1930s and 1940s, including Max Wertheimer (1880-1943), Kurt Koffka (1886-1941), and Wolfgang Köhler (1887-1967), argued that we create forms out of their component sensations based on the idea of the Gestalt, a meaningfully organised whole that is more than the sum of its parts (Table 1).

The work of many scientists suggests that there is a ‘social dimension’ too in perceiving form. While the human brain is built to make social connections, a need considered as fundamental as food and water, the social make up of each individual brain is unique [4 (Matthew Lieberman)]. Ezequiel Morsella [Ref] states that “our conscious thoughts are much more tightly linked to the external environment than we might realise, and that we have less control of what we will think of next.” It has also been established that personal experience plays a key role in affective processing, and such responses come about through learning and experience [6 (Damasio, 1994)]. An “affective” response is defined as a fast, associative and automatic reaction that guides information processing and judgment [Ref (Zajonc, 1980)].

Table1: Summary of Gestalt Principles of Form Perception

Figure and background	We categorise input as background and foreground	Whether you see a vase or two faces – it is always about seeing a figure and a background.	
Similarity	Stimuli that are similar to each other tend to be grouped together	You are more likely to see 3 similar columns on the right than four rows	B A B B A B B A B B A B
Proximity	We tend to group nearby figures together	Do you see eight images on the right or four? Chances are that you will see 4 sets.	
Continuity	We tend to perceive stimuli in smooth continuous ways.	Most people will see the image to the right as a line of dots that moves from the lower left to the upper right, rather than a line that moves from the left and suddenly turns down. Continuity leads us to see most lines as following the smoothest possible path.	
Closure	We tend to fill in gaps in an incomplete image to create a complete whole object	Closure is about seeing a single spherical object rather than as set of unrelated cones	

The focus of the present study is to add a dimension of perceptual psychology arising from personal experience, to the processing of basic visual stimuli – both fast and slow responses. The basic premise and driving factor is the influence of cultural parameters in visual perception. The study aims to open doors for considering context aware learnings and systems in education, health, social marketing, public policy and other domains. It will be of interest to marketers, politicians, business leaders – anyone who is addressing a diverse audience with the intention to

convey a precise message. Its potential applications include better design of user experiences, including innovative products and services.

METHODOLOGY

An experiment was designed to produce generalisable knowledge that human beings are capable of ‘seeing beyond what is shown’ and that what they see is coloured by the ‘impact of individual experience’ for the same inanimate visual stimulus across multiple regions. It involved showing the picture of a circle filled with red colour (Fig. 2) and asking the question: “what is the first thing that comes to mind when you see this?” The question was posed in English or the local language of the subjects. They were asked to respond within 5 seconds without sub-vocalising. In case the response was within 5 seconds, it was recorded as an instant response, else as a delayed response. Since January 2010, the experiment was conducted with 4700 voluntary subjects, including 2300 from India, 1025 from UAE and 1375 from SE Asia. Random sampling of subjects was employed to obtain a more scientific result that could be used to represent the entirety of the population.

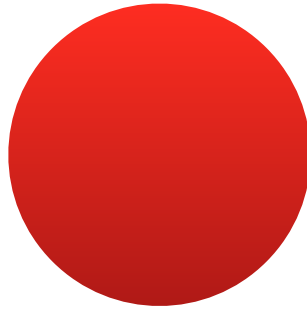
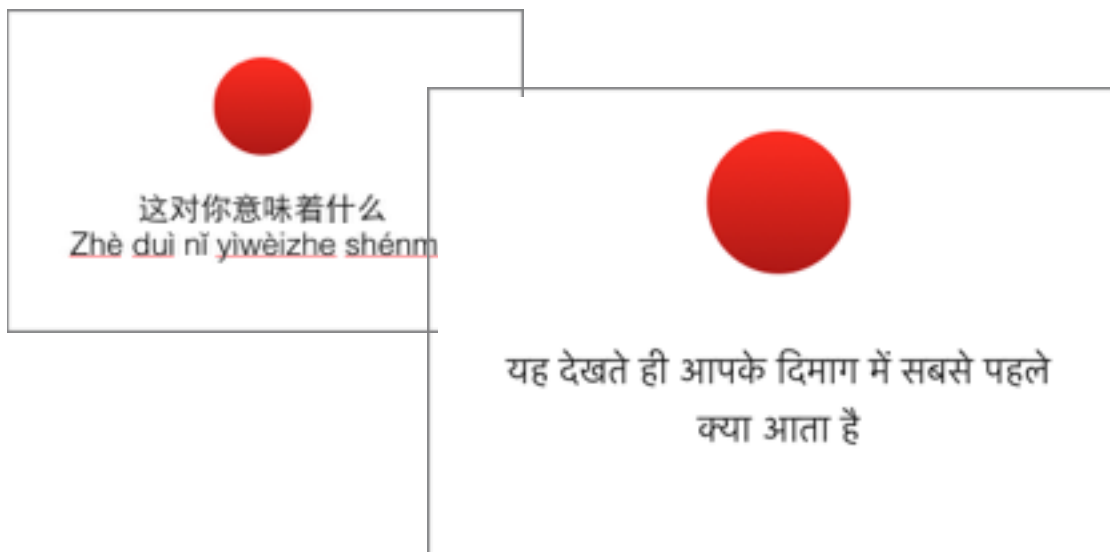


Fig. 2: Picture used for the Red Dot experiment



**Table 2: Responses of subjects from different regions (instant, delayed)
Numbers are in Percentages**

India (Total 2300)	UAE (Total 1025)	SE ASIA (Total 1375)?
Blood (0,2)	Message Notification (0,2)	Russia (0,2)
Japan (0,6)	Blood (6,0)	Hong Bao (3,0)
Mehendi (2,0)	Evil (22,0)	Ruby (0,1)
Bindi (51,0)	Henna (8,0)	Communism (0,2)
Planet (0,2)	Planet (0,5)	China (0,5)
Red dot (0,2)	Red dot (0,2)	Love (10,0)
Incomplete drawing (0,1)	Incomplete drawing (0,2)	Blood (0,2)
Top of soda can (0,3)	Death (7,0)	Japan (0,3)
Traffic light/stop sign (0,7)	Traffic light/stop sign (0,2)	Ink (0,2)
Circle (0,2)	Red circle (0,7)	Planet (0,3)
Red circle (0,2)	Red circle in white rectangle (0,1)	Red Dot (0,2)
Red circle in white rectangle (0,1)	Sun (0,4)	Control (6,0)
Sun (0,2)	Zero (0,1)	Marriage (30,0)
Zero (0,1)	Universe (0,7)	Traffic light/stop sign (0,2)
Universe (0,2)	Anger (12,0)	Circle (0,1)
Cricket ball (2,0)	Ball (0,2)	Hong/fire (3,0)
Ball (0,1)	Target (0,5)	Cherry (0,2)
Target (0,5)	Japan (0,3)	Blazing sun (0,1)
Non-veg food (2,0)	Zaffran (2,0)	Zero (0,1)
Rising sun (0,4)		Universe (0,1)
Bangles (0,2)		Ball (0,1)
		Target (0,3)
		Non-veg food (0,6)

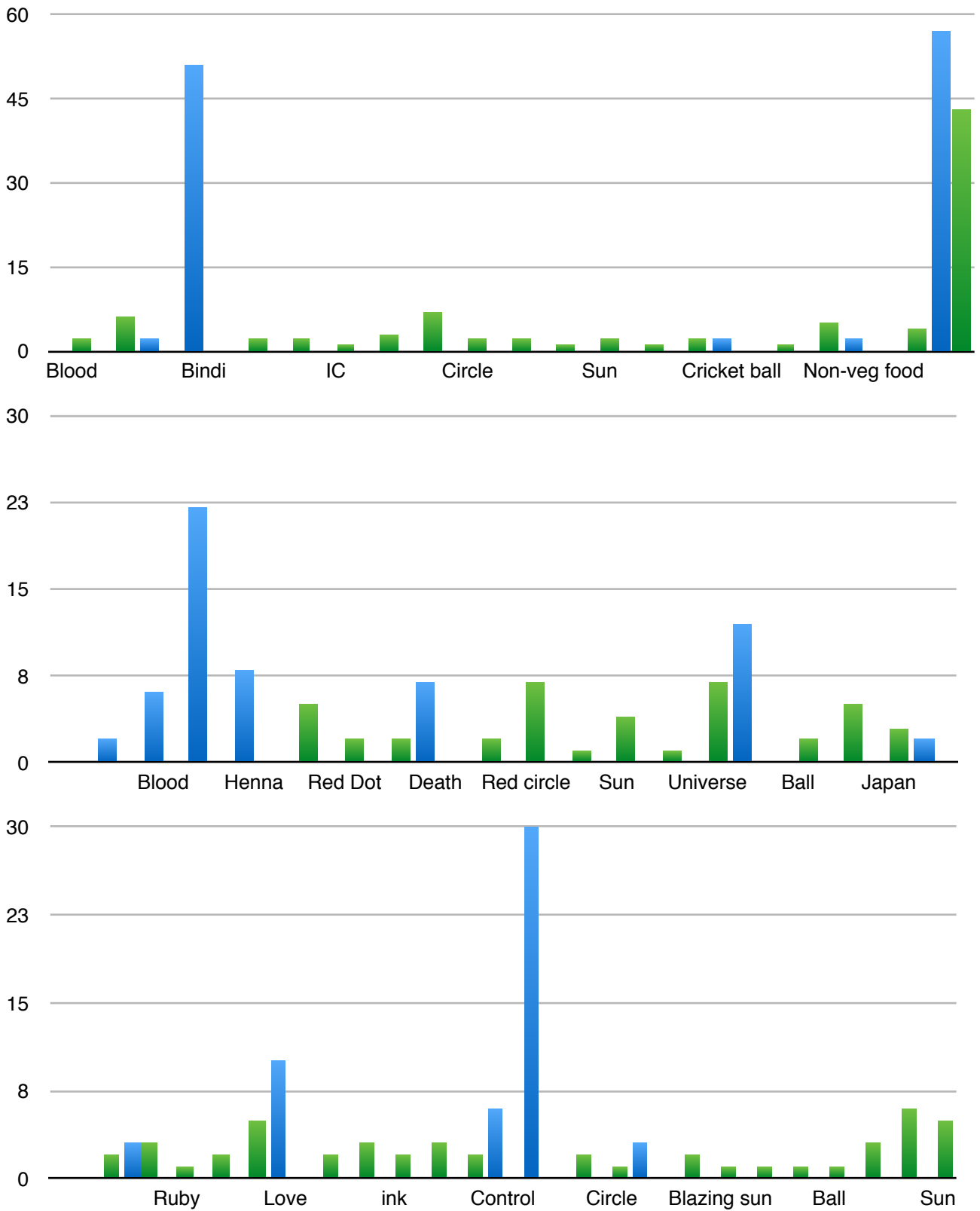


Fig. 3: Responses from India (top), UAE (middle) and SE Asia (bottom); blue bars indicate instant response, green bars indicate delayed response

RESULTS AND DISCUSSION

The responses of the subjects are summarised in Table 2. The number inside brackets next to each type of response indicate instant and delayed response, respectively. Thus, 'Blood (6,0)' implies that the picture was interpreted as blood by six % of the subjects instantly, and by zero percent of the subjects even after 5 seconds (delayed response). Instant responses, considered emotional in nature, are found to be predominant.

The most common interpretations – both instant and delayed, as well as unique responses of subjects from the three regions are listed in Table 3. The instant responses appear to have a 'social association' while delayed responses are oriented to facts. Literal and logical perceptions are few, when early. Hence, responses such as red dot, red circle and red circle in white rectangle, which are purely literal translations of the picture shown to the subjects, comprise only 5% of responses in India, 10% of responses in UAE and 3% of responses in SE Asia.

One interesting observation is that instant and delayed responses are mutually exclusive. In other words, the specific type of response (say, traffic light or sun) were either instant or delayed, not both, and this is found to quite consistent across the regions. The only exception is blood, which was a delayed response for Indians and SE Asians but instant response for UAE.

Table 3: Responses of subjects from different regions (instant, delayed)

	DELAYED	INSTANT	UNIQUE
INDIA	Planet, Traffic Light	Mehendi, Bindi	Bindi, Mehendi, Cricket Ball, Top of soda can, Rising sun
UAE	Universe, Target	Anger, Evil	Evil, Death, Anger, Henna, Message notification, Zaffran
SE ASIA	Communism, Control	Marriage, Love	Russia, Communism, Hong Bao, China, Love, Ink, Control, Marriage, Fire, Cherry, Blazing sun

The unique responses reflect the socio-cultural context of each region. In Indian sub-continent, red is the traditional colour of bridal dresses, and is frequently represented in the media as a symbolic colour for married women, associated with sexuality through its connection to heat and fertility. It is also the colour of wealth, beauty, and the goddess Lakshmi. India is also a predominantly cricket-playing nation as evidenced by that unique response. The Middle East primarily views the colour red as cautionary and can also evoke feelings of anger and rage.

In China, red (红 pinyin: hóng) is the symbol of fire. It carries a largely positive connotation, being associated with courage, loyalty, honour, success, fortune, fertility, happiness, passion, and summer. Red is associated with weddings (brides traditionally wear red dresses). Special red

packets called 'hong bao' in Mandarin or 'lai' in Cantonese - are specifically used during the Chinese New Year to give monetary gifts. In Japan, red is a traditional colour for a heroic figure.

The diversity of responses across culturally diverse regions reflects the 'associative nature' of the instant responses seen in the experiment. It is also observed that emotional associations emerge first. Modern cognitive science supports the distributed representation theory, that states that a specific stimulus is coded by its unique pattern of activity over a group of neurons, and not stored in a single neuron.

This study establishes that our cultural impressions combine with perceptual organisation to create unique imprints and responses to stimuli. Neurobiologist Steven Rose had pointed out in *The Future of the Brain* (2005), that a snapshot of the brain's current state might be meaningless unless we knew the entire life history of that brain's owner – including the social context in which he or she was raised

CONCLUSION

The range of stimuli that we even notice has been selectively pared down over the course of millions of years of evolution. *HomoSapien* newborns come equipped with powerful learning mechanisms that allow them to change rapidly so they can interact increasingly effectively with their world, even if that world is unlike the one their distant ancestors lived in. Generations of 'culturing' determine which information in our environments we need to pay attention to, and which information we can pass over. Every interaction with the environment acquires a 'special meaning', for each person. Since cultural context, which assists in the formation of neural pathways, significantly impacts the response to stimulus, the job of anyone who wants to communicate anything to a diverse audience is rendered hugely complicated.

The qualitative as well as quantitative results of the Red Dot experiment carried out in this study confirms the following: (1) the same stimulus can produce divergent responses from different cultures; (2) Instant responses are typically emotional and social in nature; and (3) logical responses emerge later.

The study also poses a few new questions that can be take up in future investigations. One is that the education content shown from childhood shapes our meaning of the world. Propaganda based education therefore, harms our world in unimaginable ways. How do we bring objectivity into education that leads to a world that values peace above differences? Second, political leadership in particular, makes communication that is global in nature. What stereotypes are we reinforcing and how does it widen gaps between cultures? Third question is about the billions of advertising dollars that are spent; how can we use them to achieve a 'new common understanding' of the world?

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