

Introduction

This is the third issue of Design Thoughts. Our doctoral students with their passion for research along with their faculty mentors have written the papers for this issue.

Once again, here is a collection of thoughts on design – a spectrum that covers in some sense what dedicated efforts on research can do for the field of design. The first paper by Neelakantan along with his faculty adviser Professor Uday Athavankar looks at how naming of the apartment blocks by builders in Mumbai is meant to invoke a desirable relation between nature and the urban home. Pramod Khambete and his guide Professor Athavankar investigate ‘Grounded Theory’ as an effective method for user experience design research. This paper is followed by Sherline Pimenta, who is on the verge of completing her doctoral thesis. She, along with me as her faculty advisor, looks at how to define Visual Narratives. Nanki Nath, working with me, has looked at the problems of reading bilingual text on sign boards. Parag Vyas, working with Professor Vijay Bapat and on the verge on completing his doctoral work, has written about identification and classification of semantic units used in formation of patterns in Kundan jewellery - a traditional type of Indian jewellery.

Hope you enjoy reading the works that are spread across and delving with naming and architecture, to understanding user experience and bilinguality in signage systems, to storytelling in visual imagery and investigating the semantics behind patterns in jewellery making.

Do enjoy reading this issue – we look forward to your feedback and suggestions.

Good thoughts,
Ravi Poovaiah,
Editor,
Design Thoughts

Natura Domestica: nature and/of/in homes

Neelakantan P. K., Uday Athavankar

Nature and Homes

What does it mean to live in homes which go by names like 'Vasant Lawns', 'Hyde Park', 'M K Meadows', etc? The celebrated residential tower-buildings, dominant expressions of Indian metropolitan urbanity have shown a marked preference for such christening; increasingly so in the recent past. These names are remarkable for the presence of natural elements like 'Lawns', 'Park' and 'Meadows'. Cursorily, one finds expressed in them, perhaps at a symbolic level, an association with the foreign, the exotic, and the natural in various forms. At least in figurative terms their occurrence in the name provides a glimpse of their import. This paper takes this keenness of the name to express nature as symptomatic of a deeper relation between nature and the urban home.

The recurring motif of nature functioning probably for evocative appeal points at least to its being a prized element in naming the home. Does this strong presence, indicate to its being crucial, maybe even necessary in conceptualizing the home? An inquiry of this sort can be prematurely aborted with an obvious reason: that these names do not go beyond being indicative of an expressed desire for that which is lacking in congested urbanity¹.

1. With these names, the apartments also seem to make claims to have reserved more area so as to provide for such activities. In a space-starved Mumbai, one knows only too well the impossibility or falseness of such intentions, if they exist. It is more a result of building bye-laws which demand open spaces proportional to the height of the building, than that of any any well-meaning intent. The question to ask is not whether really there is a meadow or not. Or maybe it is not surprising after all,

This reason can be extended to connect the purpose of this evocation to the softening of the dreary urban reality. Even so, in no way does it inform us about the modality of expression of this desire. No clue is supplied as to which aspect of the complex category of nature is regarded suitable and subsequently structured for purposes of home-making. Even if the virtual presence of nature is a result of the actual distance from nature, it tells us nothing of the manner in which nature is comprehended. Therefore, it is imperative to ask: 'How is nature comprehended?' But the question: 'How is nature conceptualized in the apartment-block home', can only be posed with the awareness of it being nested within a bigger question: 'How is the apartment block-home conceptualized?' This investigation might be worthwhile therefore not just in grasping how nature is being interpreted for the home, but also for possible insights into the conceptualization of the urban home itself.

Nature of Homes

The Urban House is a thing Architects design, Builders construct and people occupy. Such houses become homes through inhabiting or dwelling. The home can therefore be understood as a practice². The above question regarding

that nature would only be prized in places where it is not easily available, like the oasis in the desert. It would be well neigh impossible to find a meadow in Mumbai.

2. In Shelly Mallet, 'Understanding home: a critical review of the literature, in *The Sociological Review*, Vol. 52, Issue 1, pg 62, the phenomenological position of viewing the home as a verb and therefore not as a thing, but as a practice, especially helps observe how people perform the home.

the home-concept can be rephrased: ‘How do people do the home?’ allowing the role of nature within this performance to be examined. The house in a material-physical sense is an object of design; a most common architectural type. The home as a concept which involves intangibles is multi-dimensional³. In Urban India, especially metropolises like Mumbai, the Home cannot be thought of separately from the Apartment-block. The space-starved and skewed urbanity of Indian cities is legendary. So also are the exorbitant real estate, the homelessness and the vertical stack of compartments called home.

Literature on urban homes in India is dominated by discussion regarding lack of housing facilities and housing for the poor. Popular perception of urban homes, especially the intangible aspect of apartment-building homes, does not seem to have merited much discussion (except from a real-estate perspective). Various media like magazines, newspapers, movies and television could be potential sources for deposits of popular home images. These provide alternative indirect sources, other than direct discussion and interviews with people, to gain access to popular comprehension of home. The builder’s brochure for apartment-blocks is one such source which might make available insights into the function of nature in urban homes.

Images of Home

If the architect’s drawings and renditions form part of the specialist discourse on the house, then the builders/developers brochure/marketing materials forms part of the popular discourse on the home. The brochure, produced by the builders, is primarily intended for eliciting investment

3. Ibid. describes the home as a subject is at the intersection of various disciplines like architecture, psychology, sociology, history, anthropology, philosophy, etc.



Figure 1: The private housing brochure and its contents

for residential projects through bookings from prospective inhabitants. For this purpose, not only does it describe the house, but also happens to communicate intangible aspects concerned with the ‘feel’ of the home. This dual aspect takes the form of: the functional description (represented by technical drawings like plans) and the conceptualization of the home (represented by general images involving people and the tag-lines).

Both find representation through pictorial/visual and linguistic material. These materials also include evocative images and poetic texts of a very general nature. The brochure is a device to present an alluring image of the home with promises to actualize it. In doing so it also never fails to clarify its own status on the back flap – that all material contained in the brochure are of a conceptual nature and all images and drawings including the plans are subject to change; the developer holding the right to those changes⁴.

4. Kabra and Associates, Builders and Developers, in their brochure, *An abode for every dream*, NOTE: “All the plans,

The Brochure acts as a source which attempts to articulate the meaning of a good home. It attempts to describe the home and tries to capture its attributes. It also professes what a home should be. The role of nature in both these operations could be gathered. The simulacral status attributed to the object via advertizing hence demands alertness when treating the brochure as a popular source⁵.

Performing Home

An assortment of around forty contemporary private housing brochures (both actual and e-brochures) from various metro-cities in the country form the basic advertisement material pool for the ensuing analysis. Around two-thirds of the brochures are from Mumbai. These are then subjected to analysis which is primarily semantic in nature. As discussed above, some images and texts in the brochure explicitly deal with communicating the feel of the home; a significant number of which figure nature.

This theorizing is restricted to: (1) the middle/upper-middle class, (2) young and middle-aged couples whom the brochures seem to target, (3) Indian metro-cities (not smaller

drawings, amenities, facilities, etc. are subject to the approval of the respective authorities and would be changed if necessary. This discretion remains with the developers". This is true for all brochures.

5. Jean Baudrillard in his 'The Consumer Society: Myths and Structures', London: Sage, 1998, describes third-order simulation which is a model which generates what is described as 'hyperreality' – which is actually a world without a real origin. The real is not part of the equation here. According to him, hyperreality becomes in post-modern situation, the dominant way of experiencing and understanding the world. The housing brochure falls into this category of the 'pure image' because of two reasons: (1) the object (apartment) does not yet exist, and (2) the disclaimer which attributes all images to the status of concept. Both these push the status of the home described to that of an ideal.

cities and towns), (3) 'new' homes (the brochures sell new homes), (4) the seller's view-point and portrayal of people's ideal home desire. The adopted method of analysis involves freeing the images and text from the brochure-context so as to enable their grouping into conceptual categories, which might not do justice to the brochure-experience as a whole, intended to perform as a marketing-device. The brochure might produce home-meaning as whole, which might not be reducible to its parts, therefore the limitation.

The aim is to observe and examine the nature-component within this home-meaning production; the premise being that the images will be revelatory with respect to nature's role in ideal home projection. Indications of nature in the form of elements are already provided by the home-names. The deposition of these representations in the images will be studied. Further, considering the home as a practice, activities of people in natural settings (through physical gestures and the setting in which these occur) will be examined. Only the general images from the brochure are separated out for analytic treatment; the functional descriptive images of the object are ignored. The images are isolated from the brochure such that they are whole, uncropped, as they were originally intended to be viewed. This reading of the advertizing material focuses on the content and not on the design of the brochure.

Images of Nature

The possibility that names might be functioning purely at a symbolic level, prods us to observe the logo of various apartment-blocks for further indications to its existence. Flowers and leaves, in terms of recurrent occurrence, side-line trees, mountains, lawns and landscape (see figure: 2). In some few cases, nature is restricted to the symbolic color green.



Figure 2: Along with the name, the home-logo indicates the presence of natural elements

Nature conveyed through both photographic images and graphical renderings in the form of: (1) Vegetation, (2) Water, and (3) Sky, offer more insights. As vegetation it makes its appearance through the following elements: (a) lawns/grasslands, (b) potted plants, (c) flowers, and (d)

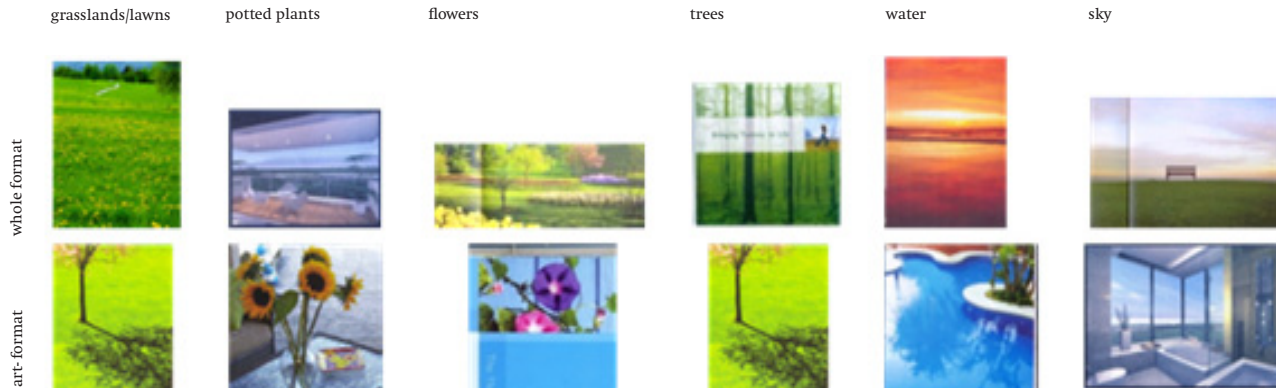


Figure 3: The forms in which Natural elements appear in the brochures

trees (see Figure 3). This manifestation happens essentially through two formats: the whole – which attempts to present a comprehensive view of nature and the part – which reveals only fragments, generally in close-ups. Each of these elements in terms of the photograph (refer to Figure 3) appears as:

Lawns/Grasslands: In formats showing nature in the whole, the grassland/lawn appears extending till the horizon, touching the clear blue sky. Other whole-formats include perspective views of the building which reveal the presence of the lawn in the garden, around the apartment-block. The birds' eye-view or site-plan especially shows the layout of the landscape around the building – all that is not the paved area is covered by green (indicating lawn). Part-formats display fragments – a patch of lawn; sometimes blades of grass.

Potted plants: Potted plants have an invariable presence in all terraces/balconies. Such spaces are almost always shown for their possibilities of opening to the outside and containing 'green'. The balcony/terrace being the only bit of private open space (not to mention the allure of this

aspect) in the urban context, is highly coveted. The projection of this valued space is proof of a strong desire for the house-nature interface. Though isolated views of this transition space itself are few in number, the images that portray the buildings from the outside display spaces like the balcony and the terrace. The presence of potted plants is evident in the external perspectives of apartments, in the rows of green smudging the parapet-lines of the balcony. Even in the plan-drawings, there is a strong desire to show the 'openness' of the space through depiction of plants. Therefore to possess a bigger balcony indicates more nature and very obviously, more expense! The threshold space is where the 'spillover' of the house onto the outside takes place; a private outside. But potted plants populate not just these threshold spaces, but also the interiors of the house. They are very conspicuously present in the all the interior views of the rooms.

Flowers: Flowers appear in the grasslands, as flowering plants in the landscaped areas, they appear in logos, in the brochure, in the interior in flower-vases, in people's hands. Symbolically, the close-up images attempting to capture the freshness and the blooming beauty of nature might stand in for a lot of things. Like they are displayed on a variety of communication devices like marriage invitations, greeting cards, etc. The flowers all appear to belong to exotic varieties, the kinds that grow in hill-stations and in cold climes. The brochure is interspersed with close-up images of nature – flowers, lawn, tender leaves, etc. these close-ups naturally blur the background thus erasing the context.

Trees: Whole-formats show trees crowning the landscape in the distance, at the margins. Sometimes dense tree-canopies are seen at a distance. They are conspicuously present in all site-plans. In the Part-format, snapshots of parts of trees – like trunks, branches and boughs are shown.

Water: As in the case of the images discussed above, the ones depicting water-bodies have less to do with providing a better idea of the place or site than evoking qualities other than that of the context. Rarely do they have a contextual basis – the presence of a natural water-body on or its closeness to the site. Even if they do, the attempt to depict the context is always too exaggerated, glamorized and exotic. Irrespective of their presence/absence on the site, images of water-bodies materialize in the brochure in two forms: (1) as the ocean stretching away onto the horizon or the lake and (2) as the quintessential swimming pool – images of the pool-side with colorful parasols, reclining chairs for sun-bathing, etc.

Sky: The clear blue sky is a favorite with all the brochures, appearing mostly as spring-time and by no means summer; occasionally as the sunset sky!

What does the presence of these elements and the manner of their presentation tell us about the role of nature? Let us examine more closely the elements and the modality of their being made evident.

The display of the grassland/lawn, is on the one hand, a broad and sweeping landscape extending till the horizon. On the other hand, it presents itself in finer form as blades of grass. This presentation as both lawn and blades of grass signifies the requirement to see it both as a whole and as detail. The part-format, in so far as they are close-ups (which predominantly they happen to be), attempt to showcase detail. Activities like sitting, sleeping, playing, sprawling, occur in close contact with the lawn. Trees generously scattered especially over site plans and elevations might have a purpose more than anything of projecting the developed site as aesthetic and beautiful. But in the close-up format, it appears as a fragment. The sweeping fields of flowers, in the whole-format, other than offering an abundant visual

treat, appear in the part-format, in close-ups, as single flowers or bunches of flowers. If in the whole-format, the potted plant is part of a space, like the terrace or the interior, then in the part-format, the potted plant itself is the central element of the image. In the first case, it is shown as having been included into the living space; in the second, the potted plants' property of 'containing nature', shows the potential for its inclusion into daily life. Both are part of the desire to incorporate and get intimate with nature. While representing water-bodies, in the first case, the visual quality of nature as beautiful and vast is projected. In the second, it is nature as contained for recreational purposes. The sky appears either as horizon against which human activity is silhouetted and something to be gazed at or as background for the apartment building itself. In

part-format, it appears as a view from the home-interior framed by the window.

On the one hand, the vastness of the grassland, the trees as elements of site plans and elevations, the sweeping fields of flowers, the huge expanse of the water-body, and the immensity of the sky and the horizon, project nature to be experienced as an abundant, grand spectacle. On the other hand, the patch of lawn, blades of grass, the tree-trunk and canopy, the bunch of flowers/single flower, the water-body as a swimming-pool, the sky/horizon as a framed element (through the window) of the interior, etc indicate the experience of nature up-close, as something to be lived close to; to be maintained at close quarters, made part of, organized and incorporated into daily life.

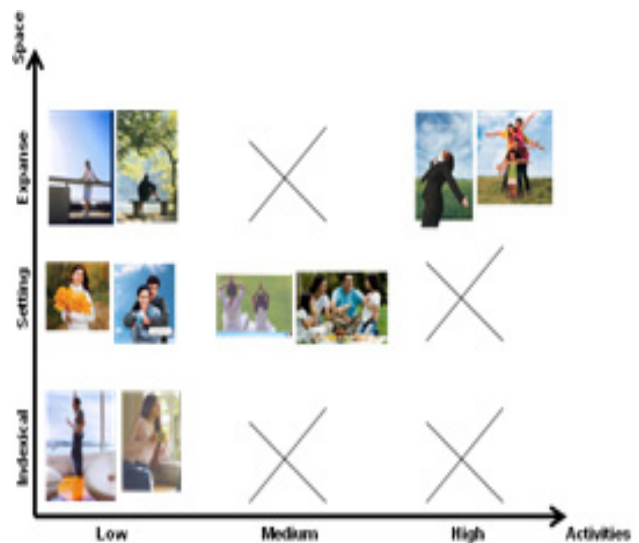
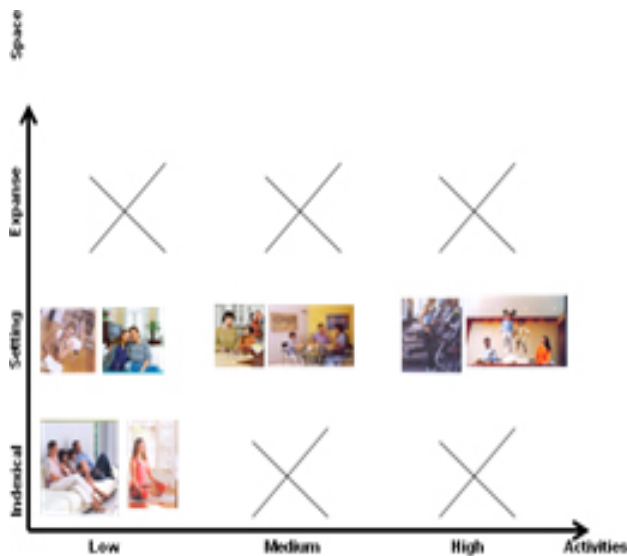


Figure 4: Space-Activity matrices for both Exterior (Nature) images and Interior images

Performing Nature

'What is the ascribed role of nature in the performance of the home?' This query shifts the primary focus of examination from elements of nature to activities performed 'in' natural settings. This question, based on the premise of treating the home as a verb, i.e. as a practice, helps gather connections between the activities, nature and the home⁶. The depiction of nature through elements as an expansive, unrestrained space (as seen in the case of elements of nature), both directly and indirectly seem present even in relation to activities. In addition, are instances of natural space receding into the background as setting permitting the activity to dominate. Thus, there are three categories of representing the quality of nature as a space which is: (1) Expansive, (2) Indexes expansiveness, and (3) a Setting/background. The activities themselves, based on the level of the physical effort read from their gestures can be categorized into: (1) high (portraying tremendous physical action), (2) medium (actions perched between high action and quieter ones) and (3) low (physical activity at a minimum) (see Figure 4). Though the focus is on activities in natural settings (basically the exterior), comparison and contrast with activities in the interior, would not only make known activities shared between the two, but also the ones exclusive to the exterior.

High-activity (shown incapable here of indexing space), finds expression in the unbounded and unrestrained expansive quality of exterior natural space; this exuberance being tamped a little in the interior, which very obviously

6. This question subscribes to the view that the home is a practice. This means the home needs to be seen as performance. Therefore here, the concentration is specifically on the performance of the home, and the role nature would play in this performance. How the home is practiced or how people 'do' the home in Shelly Mallet, 'Understanding home: a critical review of the literature', in *The Sociological Review*, Vol. 52, Issue 1, pg 62

is devoid of sweeping spatiality (Figure 4). High activity is restricted to using interior space like a setting; its quality being fully realized only in the exterior. Medium activity, on the other hand, in both the exterior and the interior formats, is associated with space only as a setting. Lacking the gravity of low-activity and the exuberance of high-activity, the commonplace and mundane medium-activity require the employment of space as setting. Low-activity, present in all three forms of space in the exterior, is excluded only from the category expansive of the interior-format. It is solely in low-activity that the expansiveness of space gets indexed. In the category expansive, people performing low-activity function as figures, turned away from the camera, part of the expanse.

If the indexical quality is a function of the low-activity images, then the setting-like quality belongs purely to the medium-activity images. Both these traits are shared by the exterior (nature) and interior (room-space). It is only the expansive quality associated with both low-activity and high-activity that belongs exclusively to the exterior-nature. This is perhaps the attribute, lacking in the interior, which is being compensated for by the category expansive. As already indicated by the indexical, this open spatiality is something that only nature seems to unambiguously offer.

High-activity images primarily employ nature as a spectacular setting highlighting the grandness of the extraordinary gestural expressions. Medium-activity images portray nature as being another space for the performance of the more ordinary activities of familial bonding. Low-activity images utilize nature as a finer component of the contemplative and reflexive relation people have with themselves and with nature. Nature appears thus in two roles: (1) as that which imparts in both a direct and implied fashion, a spectacular, vast spatial atmosphere; an anti-thesis of the restricted confines of the interior-home room-space, and (2) as a component, very much like the



Figure 5: Leisurely activities and setting as part of nature are expressions which tend to evoke vacations

interior-room, to be incorporated into the intimate texture of home-life.

Leisurely Nature

These characterizations of nature through the settings, even remotely, fail to affiliate with urban spaces. Much of the depicted activity in no way appears conventionally domestic. As much as they seem to belong outside the city, they also belong outside the domestic realm. The human figures engaged in activities that seem chiefly extra-ordinary and extra-daily, can definitely not be done on a normal working day. If routine performances and the mundane everyday are out of question, what exactly are they busy in? Their remoteness from the domestic certainly reminds one of places and activities associated with holidays and vacations; notions belonging to the concept of leisure⁷. It becomes abundantly clear on conceptualizing the images explicitly in terms of leisure (see figure: 5).

7. Rob Shields, in 'The Production of Space', pp 141-185, in 'Lefebvre, Love & Struggle: Spatial Dialectics', USA: Routledge, 1999. According to Lefebvre: if work excludes time for living, then non-work becomes completely identified with 'leisure spatialization' – spaces meant exclusively for leisure.

When read in conjunction with the tag-lines like 'Wake up to a new horizon everyday', 'the New World beside a lake', 'Discover Life in full Bloom', 'Choose to live green', this tendency is reinforced. Therefore, nature as conceptualized in the brochure, expresses desire for spaces and activities far away from congested urban confines. What does this mean for the home?

Nature in Homes

Nature is employed for the exclusive projection of unbounded and unrestrained space. Both the direct and implied references to sweeping and expansive space through nature, difficult if not impossible in an apartment-home, point to the desire for such projections to overcome the restricted confines of a flat. This seems to be the primary role accorded to nature. Additionally, this role at least in spatial terms, fulfils the requirement of advertizing to exaggerate and glamorize the home⁸.

The mass-housing feature of the apartment-block, in its expression, is restricted to technical drawings like the plans and the elevation. The general images gloss over this actuality by framing a single individual or a single family as the primary consumer of the abundance that is nature. This focused portrayal of the exclusive private ownership of the bountiful and sweeping nature, by denying the presence of the community, evokes a single-family bungalow or a farm-house in the urban outskirts.

The representations of nature as both spectacular and something to be included into the intimacy of the home, both of these, are possible only in a place away from the city. The activities performed in nature also in no way evoke

8. Examples of the inclusion of nature in privatized public spaces have allowed conceptualization of nature itself as simulacra. Todd Gitlin 'Domesticating Nature', Theory and Society, Vol. 8. No. 2 (Sep., 1979), pp. 292-297.

domesticity. They point towards a very non-urban place. The disposition of the leisurely activities in nature towards holiday and vacation, reinforce the tendency of representations of nature (as spectacular and as something to be lived close to) to point to places outside the city. This projected landscape appears on the one hand as exotic and on the other as well-managed. This combination of both the exotic and



Figure 6: Artists rendition of Sky-villas in Unitech Developers, 'Unitech Grande-Noida', Noida¹⁰

well-managed quality of the landscape is only possible in a holiday-home or a hotel or resort. Therefore the question: 'Does the home (a place of relatively stable, permanent residence) desire to pull in features from another dwelling-type like the resort⁹ (a place associated with travel culture and mobility)? From this perspective, the aspect of the exotic

9. 'A resort you will never check out of' advertized on a hoarding by Vijay Group, Vijay Vilas, Thane

and foreignness in the name (eg: 'Jasper' in 'Jasper Lawns') begins to makes sense.

What do representations of nature and activities performed therein suggest in terms of a home-nature relation impossible to actualize in the urban realm? Does it indicate an expression of the urban romanticism for dwelling-types like bungalows and farmhouses? Or does it announce the coming of a new type resulting out of a negotiation between a desire for the single-family house and the apartment-home? At least the recent concept of sky-villas, which are essentially apartment-blocks consisting exclusively of duplex flats (see Figure 6),, having liberal terrace-area, advertized as being vertical bungalows, advocate this negotiation.

References:

- Jean Baudrillard, *The Consumer Society*, London: Sage, 1998
 Rob Shields, 'The Production of Space', pp 141-185, in Lefebvre, Love & Struggle: Spatial Dialectics, USA: Routledge, 1999
 Shelly Mallet, *Understanding home: a critical review of the literature*, in The Sociological Review, Vol. 52, Issue 1, pg 62
 Todd Gitlin, *Domesticating Nature*, Theory and Society, Vol. 8. No. 2 (Sep., 1979), pp. 292-297.

Images from the following Housing Brochures:

- Omaxe, Park Woods, Baddi
 Parshvanath, Exotica, Gaziabad
 Skylark Housing Pvt. Ltd, Skylark Apartments, Mohali
 Runwal Group, Runwal Pride, Mumbai
 Wadhwa Developers, Palm Beach Residency, Navi Mumbai
 Marickar Group, Morning Glory, Cochin
 Marvel, Zephyr, Pune
 Lodha Group, Lodha Imperia, Mumbai
 Vijay Group, Vijay Vilas, Thane
 Arihant Universal, Arihant Darpan, Mumbai

10. <http://www.scribd.com/doc/2928437/unitechgrandenoida>

Grounded Theory: An Effective Method for User Experience Design Research

Pramod Khambete, Uday Athavankar

Introduction

The term “Experience” is generally considered to be self-explanatory, but remains ill defined. Chamber’s dictionary defines the verb experience simply as “to feel or undergo”[1]. Noting that experience is an elusive notion, Knutson and Beck (2003) propose that it however has two essential dimensions: it results from participation (of an individual in a situation) and is internal in nature; therefore individualized [2].

While “Experience” has always been implicitly a part of all design activity and outcomes in various domains like architecture, product design and visual design, the notion of “Experience Design” is somewhat recent. Varied views prevail about the term Experience Design; what it means, whether one can design experiences at all, and even whether such a construct is necessary. Nonetheless, one must acknowledge that the term is now well ensconced in the lexicons of several disciplines. Particularly, the domains of marketing, service marketing, and Human Computer Interactions (HCI) (!) have embraced the terms such as Experience, User Experience and Customer Experience, from their own perspectives. Starting with Pine and Gilmore’s late ‘90s concept of Experience Economy and assertions that fundamentally firms should “stage” experience for their customers [3], we seem to be now living in a paradigm that treats experience environments and experience networks as the primary source of customer value[4].

User Experience Design can be viewed to be about things that are actively experienced: something that involves the

dynamics of space, time, objects, the states of the participants and the context in which the experience occurs. It is something “whose design needs to be grounded in the nature of that experience”[5] (The term User Experience is used henceforth to encompass the phrase Customer Experience as well. The difference is not relevant for the purpose of current discussion). Further, most experiences of using products and applications today have a greater or lesser degree of social dimension. The technology dimensions are also changing dramatically, as exemplified in the ubiquitous mobile connectivity. One can surely affirm that User Experience Design is now important enough to attract increased research attention. Further, there is a likelihood that the research problems would be complex, even “wicked”[6], and socially rooted. Clearly a wide repertoire of research methods is essential in this scenario.

Research is understood as an inquiry aimed at contribution to the body of knowledge. However, practitioners are likely to interpret the term Design Research as the process of acquisition of knowledge to ground, inform, and inspire the design outcomes. The discussion that follows is carried out with the former perspective. Undoubtedly, it is informative to the practitioners as well.

User Experience Research and Qualitative Research Methods

Qualitative research methods have a long history, starting from colonial ethnography carried out in the 17th century [7]. Since then the methods have been used extensively in

social sciences, health sciences, humanities, business and HCI domain. Design activity is immersive, aimed at insights and solutions based on the designer's individualistic understanding of the problem and the context. Therefore, designers and design researchers alike might have a natural affinity towards qualitative methods, several of which have a post-positivist underpinning that questions the idea of a shared, single reality. As a result, they may have the temptation to jump to the erroneous conclusion that qualitative research methods are always appropriate in the domain of User Experience Design. In reality, the choice of research methods is linked to the problem being investigated. For instance, if the problem involves finding correlation between perceptions of the experience provided by a particular feature of a product (e.g. colour) and the age of the user, quantitative methods are preferable. However, qualitative methods may be suitable if the intent is to discover which contextual issues and the details of user's interactions with the product lead to such perceptions. In general, one can say that qualitative research is appropriate if the problem is framed to understand a phenomenon, and how experience is created and given meaning by the participants.

Before determining whether to opt for qualitative research, researchers should answer questions such as [8]: What am I aiming to find out? Am I interested in study of the phenomenon in detail, or in comparisons and variations in the different aspects or variables? How have other researchers approached similar situations? Will quantitative or qualitative methods inform me more?

Once the researcher decides to do qualitative research, there is a wide array of methods from which one or an appropriate combination must be chosen. The methods include case study, ethnography, grounded theory, focus group, action research, discourse analysis, narrative research and several others.

It is worthwhile to discuss at this juncture the importance of the researcher's position about 'theory' in the context of the research problem being studied, as it influences the choice of the method. Does the researcher plan to test an existing theory, and the outcome of research would be its confirmation and refinement or, is there an aim to build a theory? In the former, the research would commence with forming hypotheses or propositions based on established theories. In the later case, "theory" is interpreted somewhat flexibly, accepting that the initial assumptions would quite likely change gradually as the data suggests new ideas, leading to the construction of the theory. Theory, according to this perspective, is not a rigid, stable, testable formalization, but rather a collection of ideas that undergo redefinition. The viewpoints represent two ends of a continuum on which various methods can be positioned. Ethnography, which generally starts with a commitment to some type of cultural theory, lies at the former end, while Grounded Theory, which aims to develop new concepts and theoretical ideas, emerging out of the data and the context, lies at the other end [9].

Therefore, if the researcher's goal is to develop substantive theory, particularly, in areas where existing knowledge is limited, or to provide a fresh perspective to the existing knowledge about the phenomenon being studied, Grounded Theory is a suitable approach.

Grounded Theory: A Brief Overview

Grounded Theory refers at once to a methodology, method as well as the outcome of the research process [9]. It contains well defined procedures for analyzing empirical data, typically leading to middle range theories, i.e., theories that pertain to specific aspects of the phenomenon being studied, rather than broad, macro level theories. In the words of Barney Glaser and Anselm Strauss, the originators of Grounded Theory, such theories, "fall between 'minor

working hypotheses' of everyday life, and 'All Inclusive' grand theories"[10]. The use of Grounded Theory procedures leads to a coherent, well connected set of concepts that describes as well as explains the phenomenon under study. Being based on empirical data, the concepts possess predictive power when used in the right context. The usefulness of the approach in the User Experience Design domain is evident, as frequently the research could be driven by the intent to immediately apply its outcome, rather than develop a 'grand theory'.

Grounded Theory, though originally developed for application in social research, has gained wide acceptance in various other domains such as business research, marketing, organization and leadership studies, technological changes and organizational changes, consumer behaviour, consumer experience, and even Information System (IS) research[9]. During the period 1985 to 2007, thirty top IS-Centric journals published 126 articles where the authors had used Grounded Theory. Interestingly, 95 of them were published during the period 2001 to 2007. The year 2007 alone accounted for 18 of them [11]. The wide and growing acceptance of the approach indicates that various scholars have found it to be useful.

Since its "discovery" in 1967, three major variants of Grounded Theory have emerged. One the 'original', Glaserian; second proposed by Anselm Strauss and Juliet Corbin and third, the "Constructivist" Grounded Theory of Kathy Charmaz. The philosophical underpinnings of these are not identical, and as a result the procedures differ too. Glaser has maintained that Strauss and Corbin version is not Grounded Theory at all, insisting that it has departed from the fundamental philosophical position. However, in practice, researchers have found the Glaserian approach difficult to apply, as it does not provide practical guidelines, but relies on the ability of the researcher to conceptualize.

Strauss and Corbin version, however, does provide such guidance, at times criticized as excessively prescriptive. In practice, however, both methods are accepted as Grounded Theory and apparently more researchers are using Straussian method [12].

It is beyond the scope at present to discuss, compare, contrast and critique the variations. The reader may want to look for details in the original books ([10],[13]), views of scholars as well as examples of its application (e.g. [11],[12],[14],[15]) for gaining in depth understanding. For the current introductory purpose, it may be adequate to outline the basics of Grounded Theory drawn from Corbin and Strauss[13], with specific reference to [16], which is a short, yet comprehensive overview.

One of the strengths of Grounded Theory is that it permits the use of a single or multiple sources of data, providing enormous flexibility to the researcher. The sources can include interviews, participant observation, focus groups, life histories, and narration of experiences. Even data originating from newspapers, video tapes, and government records is acceptable [16]. However, the data collection must be done systematically, in accordance with the tenets of the method. The data collection proceeds on the basis of theoretical sampling. In this method data collection, analysis and coding progress hand in hand. Typically the first set of data is analyzed and coded immediately, and the results inform the next set of data collection activity – which data to collect, from where to collect and which aspects need special attention. Every concept that is discovered is treated as the basic unit of analysis. However, initial concepts and categories are treated as provisional, and become part of the theory by repeatedly being present in the subsequent data. Therefore, an important aspect of the activity is constant comparison of the concepts and categories as they emerge with the previously discovered ones for progressive refinement, and

eventual formulation of the theory. For instance several bits of data might belong to the same concept (e.g. from the case study that follows, regarding ATM usage ... the statements “I kept the slip coming out of the ATM till the entry was seen in the account” and “I prefer to go to the branch because they stamp on my deposit counterfoil”, both point to a concept “Need to possess evidence of transaction”). The concepts are grouped based on their relationships to formulate categories, which are at a higher level of abstraction.

The process ends when theoretical saturation is reached. It means that additional data does not lead to discovery of new concepts and categories. Therefore, in Grounded Theory there is no prescribed or minimum sample size. The yardstick for judging adequacy of the sample size is whether the sample selection was broad and diverse enough to ensure thorough coverage of various aspects of the problem being researched.

Data analysis and coding procedure is described below:

- **Open Coding:** It is an interpretive process in which data are broken down analytically with the intent to gain insights about the phenomenon under study. The events, actions and interactions are compared to arrive at concepts and categories. Categories are arrived at from the concepts looking for similarities.
- **Axial Coding:** The aim here is to understand the dynamic relationships amongst the categories, which form the basis of the emergent theory. The factors that are determined and used include: the conditions that give rise to the category, the context in which it occurs, the actions / interactions that express it and the consequences of the actions/ interactions. Tentative hypotheses are formed through a deductive process at this stage.

- **Selective Coding:** It is the process to arrive at a ‘core category’, which unifies all the categories and leads to the theory.

The method also emphasizes that the researcher should write extensive memos, which provide additional material for richer insights.

In Grounded Theory, validity of the emergent theory is essentially tied up with the rigour with which the process is applied. As such, in order to enable the readers to judge the validity, researchers should report[14]:

Adequate details of collection and interpretation of the data: The aim should be to demonstrate clearly how, why and from where concepts and categories were derived. The method demands that the theory should be traceable back to the data, and this should be the guiding principle.

Well developed concepts and categories: Concepts and categories should be sufficiently developed and presented to enable comparison with relevant literature in order to demonstrate the compatibility, relationship and, quite likely, the extension to the knowledge.

Presentation of the theory: Unifying of the concepts and integrating them into categories and relationships. The emergent ‘theory’ should have explanatory power within the specific context.

It is recognized that Grounded theory is a difficult approach, requiring utmost care, diligence, sensitivity and the ability to conceptualise. It can also be time consuming. Similarly, the researcher needs to be vigilant that the concepts and eventually the theory emerge from the data and are not ‘forced’ onto it.

Considering that several problems in User Experience Design areas are likely to have little previous literature and existing theories to fall back upon, and context in which

the experiences occur plays crucial role, Grounded Theory could be a potent tool for generating new knowledge.

A case study is presented below to illustrate the application of Grounded Theory.

Case: Discovery of the Reasons for Selection of Touch Points

The application of Grounded Theory illustrated below pertains to an investigation into customers' decision process in selection of a Touch Point for carrying out transactions, in their banking and telecom service relationship. The term "Touch Point" is defined for the purpose of this study as:

- a. An entity with which a User interacts to perform a transaction aimed at achieving a goal,
- b. OR an entity that plays a mediating role while a User performs a transaction aimed at achieving a goal
- c. The Provider has control on the presence and behavior of a Touch Point

Touch Point is a concept being investigated by the author and this investigation was continuation of an earlier study[17] in which factors that were uncovered included Lack of Convenience, Security and Control as the top reasons for not preferring a Touch Point. While the previous study focused on the factors influencing the choice, the present study aimed to build on this knowledge by investigating further the factors that play a role in the decision process in selection of a Touch Point.

Since Touch Point is a new construct, and there is limited knowledge based on framing the problem of customers' choices from the experiential perspective, Grounded Theory was thought to be the suitable method.

Before progressing with the details it is necessary to clarify the context. This investigation forms one part of the author's doctoral studies which are in progress, and it was executed in a constrained time frame. Corbin and Strauss (2008) acknowledge that constraints may exist, and recommend going ahead with a less than fully developed theoretical formulation [13]. Therefore, a theoretical scheme that met the objective of informing and guiding further work but did not lead up to a Core category was developed. However, every care was taken to maintain the spirit of Grounded Theory and diligent adherence to the procedure. It is acknowledged therefore that the following case study is a useful illustration, rather than an ideal instance of the application of Grounded Theory.

Researchers have used Scenarios, Critical incidents, as well mix as of methods such as focus group coupled with interview e.g. [18][19][20]. It was therefore decided to opt for semi-structured interviews, using scenarios and critical incidents as anchors. This approach was thought to be useful to provide an orientation to the respondents without creating a bias and maintaining the open ended nature of the interviews.

Six scenarios written in a realistic manner that depicted situations pertaining to transactions in banking and telecom Services relationship, such as depositing a high value cheque and resolving a query were administered. The respondents were required to choose only one item from the options given. The options were constructed in a manner that they embedded a tradeoff among factors such as Security, Convenience, Control, Need for Human contact, Ease of Use and Social cost (These factors were identified in the previous study). The respondents were encouraged to imagine that they had actually encountered the situation. A sample scenario appears in the Annexure A.

A depth interview using the answers as anchors was conducted after all the answers were collected. The respondents were allowed to deviate from the scenario and talk about other transactions, other service relationships, episodes and explanations, in order to elicit rich information. In order to further enrich the data, elicitation of critical incidents was done as a part of interview in line with Chell (2004)[21]. The interaction with the respondents was face to face, except for one telephonic interview, and each one lasted for about forty five minutes. An audio recording of the interviews was done with participants' permission, which was used later for transcription. Extensive memos were written during the interviews to note additional details.

The sample comprised educated individuals (at least graduates) from urban areas. It was ensured that they had awareness and access to a range of Touch Points to carry out the transactions related to the relationships, even if they might not have actually used all Touch Points.

Twelve respondents were selected through purposive sampling. The sample was skewed with nine male respondents and the rest female. The age of the respondents was from twenty five to sixty five, and evenly distributed. It must be noted that due to constraints on availability of the participants, three interviews took place before it was possible to commence analysis. This was a deviation from the ideal Grounded Theory approach, which requires commencing analysis immediately after the first interview. However, Corbin and Strauss (2008)[13] recognize such eventualities, and recommend coding such 'given' data in exactly the same manner as data collected through the ideal method. The interviews were transcribed and broken into meaningful, coherent chunks. The guiding principle was that each chunk should *prima facie* indicate a single idea. To illustrate, the two chunks, "Because, may be my other transactions are related to that amount ... in short it should be accepted by

the bank **well in time**", followed by, "... and if it is not done so, I should **have a receipt**, in case there is some problem" express two different ideas and contexts, one pertaining to the consequences of the transaction not being completed within certain time period, and the other about having evidence of the transaction. Therefore, they were treated as two separate units to be analyzed, in spite of being part of an unbroken narration. Each interview typically resulted in approximately two hundred such analyzable units of conversation.

Each unit was analyzed and coded through an interpretive process to identify the 'concept' that was being talked about. Instead of coming up with a short label for the concept, the concept was articulated in free format, to retain the essence of the idea. For Example, the above mentioned sentence part "and if it is not done so, I should **have a receipt**, in case there is some problem" was seen as representing the concept 'Need of evidence that the user has done her part successfully, as further processing of the transaction was not visible to the user', which takes into account the context in which the sentence occurred. This advantage would have been lost with short labels. The field memos were referred to capture the nuances of the ideas and context. Following the tenets of coding, categories were built by first developing concepts and then suitably aggregating them.

As stated earlier, the Grounded Theory prescribes use of theoretical sampling, with no prescribed minimum number of interviews. Theoretical saturation was reached by the time six interviews had been analyzed and coded, with steep reduction in the new concepts and categories getting uncovered as the analysis progressed. It was decided therefore to keep analysis of remaining interviews in abeyance.

Thirty Five categories emerged by this stage. While categories like convenience and need for human mediation

were not a surprise, some of the interesting categories are described below. The structure followed is: the concept/ category discovered, followed by illustrative quotations from the interviews.

a. Magnitude of adverse consequences of failure of the transaction

Magnitude of the adverse consequences, financial or even legal, in case the transaction fails was an important consideration (“... these days there is lot of misuse of SIM cards ... if it falls in wrong hands, terrorists or criminals, it would be traced to us ...”). Another determinant was dependence of other transactions on the successful completion of transaction on hand, indicating that users take into account collateral consequences as well (“may be my other transactions are related to that amount ... in short it should be accepted by the bank well in time”).

b. Perceived Need of Physical Evidence

This category surfaced very often, and may have roots in the Indian context where rectification of mistakes can often be cumbersome. Some relevant participant quotes:

- While choosing to deposit a cheque in an ATM machine, which was perceived as cumbersome, instead of the drop Box: “.. if it is not done so (cheque credited into the account in time), I should have a receipt, in case there is some problem”.
- Going to a Bank Branch to deposit a high value cheque even though it involves cost and need to spend time: “Confirmation ... and proof that this amount has gone in the right account.... yes ... they stamp the receipt (counterfoil) ... which is a proof.”

The desire to obtain evidence was noticed particularly in transactions where the customer completes actions required on her part successfully, but subsequent process needed to successfully conclude the transaction is not

visible, not within the customer’s control, and took time till completion.

c. Ability to mitigate likely adverse consequences

This seems to be related to the desire to possess physical evidence. It appears that in cases where physical evidence (such as printed receipt) is not provided by the Touch Point (or the ecosystem), the customer may create some ‘evidence’. For instance, a respondent who opted for Call Center to get a mistake rectified, said she would send a mail to the bank “Because this makes it official ... means it will go on their record that I have done something ...” or another respondent said, “... when I speak with a call center ... I note down the time, date and with whom I spoke ... that name ... So, in cross checking they can always say that no one from our side spoke ... but at least this record is there”.

d. Assurance received through other means / Touch Points

This category is related but distinct from the previous one; in that it pertains to the measures a Provider takes, which involve effective use of the Touch point ecosystem. For example: “(after issuing a cheque) if it is more than five thousand rupees, I get a message (SMS) from them ... your account has been debited”, or in case of a call center “I take up this matter with them ... then they commit ... but after 15 min or half an hour, you get a confirmation SMS from them that this is your request number, and it is being processed” There are several established practices, such as offering the facility of ‘Virtual Credit cards’, or someone calling up if a credit card is used from a place the customer is not expected to be present. However, the knowledge of the importance customers attach to such assurance does indeed help to spur other possible Touch Point ecosystem design interventions that can provide a gratifying user experience.

e. Perceived need to reach or deal with a specific individual at service provider’s end for success of the transaction

This is an interesting category, which appears to be connected with the Indian context. One can speculate that the origin lies in the users' experience with the bureaucracy in government as well as other organizations, as well as the perception that individuals rather than the business processes drive the result. For instance a respondent who chose to go to a franchisee for resolving the issue with excess bill said "Because, he will know with whom to speak for this problem ...". It seems to be an important consideration in case of transactions that are open ended in nature and where failure can lead to higher magnitude of adverse impact or if there is urgency.

f. Understanding of the Touch Point operation, including the back-end processes

Whether or not the customer understands how the Touch Point and the back-end processes work seems to be relevant. This is particularly important when a transaction spans a period of time and a several activities needed to complete it happen invisibly at the provider's end. For example, a respondent who selected Net Banking for creating a Fixed Deposit said: "if there is a problem in the software, then I should get an error message ... if don't get the error message then that means the server is updated ... (there is no apprehension of failure) that is why it is my most preferred way of transaction".

g. Leveraging / building relationships

This category as well seems to be related to the Indian context, where personal interactions and relationships do matter. For instance , a respondent who selected a franchisee for adding subscription said, "The reason is, I had taken the first connection from him ... so I have a business association ... relation with him ... and by selling this add on connection if someone is going to get any benefit ... then why not he? Who is working for me". There was also a

hint of mutual give and take in: "... perhaps ... I may get the option of selecting the number ..."!

h. Associated Social Costs / Benefits

One of the reason given by a respondent for preferring a bank representative as against requesting his spouse was "... It is a service they provide and when you can do the job sitting at your table, then why ask someone else?". Another respondent, who chose the option to request someone to go to the bank branch to deposit a high value cheque, said she will instruct the person: "If there is no queue, then (deposit it at) the counter else in the drop box", and gave the reason as "... because, even that person should not end up spending too much time". There is evidence that the likely social costs or benefits are taken into account, and as demonstrated in the second quote, a user may even take a higher risk to avoid incurring the social cost.

i. User's Value System

Value system as a consideration was an interesting find. Some illustrative quotes are:

- A respondent decided to wait for an earliest day when he could go to the bank branch to deposit a high value cheque, thereby incurring financial loss "... because (I) cannot compromise the office work for that ...".
- A value that a 'human being' should benefit, rather than an organization is reflected in: "They are any way going to charge me X amount. But if it (the benefit) is going to accrue to this person who has been giving me service throughout ... it should go to him."

Apart from the categories, some informative nuances of other factors were discovered as well. For instance, an interesting dimension emerged in connection with the category 'Perceived need for Human mediation'. There was evidence of respondents seeking human mediation in open ended situations or when they felt that a two way

unstructured communication is needed. However, it seems that the human mediation is also sought to overcome perceived difficulties in dealing with organizations. For instance, consider: “Rather, I find him (an agent) as a mediator between the company and the customers ... instead of I dealing with the company directly ... their own person ... their own representative is dealing with them ... he might get some priority ... he will know with whom to speak for this problem ... I don’t know all this ...”.

Another significant finding was the emergence of two distinct categories related to technology. One was ‘Comfort in using the Technology’, which is relevant in the usage stage. Another was ‘Confidence about the Technology used’ in the Touch Point, which is part of the higher level category of Perceptions and influences the decision. Technology comfort (or its negative counterpart Technology Anxiety) is a known construct that has been studied by several researchers from different perspectives [22][23][24] . However, ‘Confidence about the Technology used’ appeared to be related to the Touch Point ecosystem being deployed, and affecting the outcome of the transaction in an instrumental manner, and perhaps a new aspects that can be investigated further. The next level of abstraction was carried out by analyzing the categories in terms of their relationship with each other,

the relationship with the transaction involved and what role they play in the decision to select a Touch Point. This resulted into higher order categories:

Further, each of these categories can be associated with the stage in the encounter in which it plays a role. The stages are: During the Decision Process to select a Touch Point, During Usage and Post Usage.

The process led to arriving at useful insights as well as directions to build a model of decision process in selecting a Touch Point.

Just to provide a glimpse of the strength of the method, it is worth mentioning that the basic level approximately three hundred concepts were identified, which aggregated in thirty five distinct categories (see Annexure B for examples). Each of them can potentially be a User Experience design input. It is not possible to elaborate on all the findings due to the constraints of space, and the details given above should adequately illustrate the kind of insights one could obtain by using the Grounded Theory. The interested readers are welcome to contact the author for additional information.

Sr No	Higher Order Category	Description	Illustrative context
1	Conditions	Situations and contexts, generally beyond the user's control	Transaction requires a physical artifact
2	Experience	The actual experience the user gets while deciding or using a Touch Point	Feeling of control
3	State	The User’s state of knowledge and being	Past Experience - Positive or negative
4	Perceptions	The user’s perceptions about aspects of the Touch Point operation of usage	Perception of Security associated with the Touch Point
5	Disposition	The user's mental outlook and inclinations	User's Value System

Table 1: Higher Order Categories

Categories with significant relevance to the design of Touch Point ecosystem experience were discovered. For instance, the insight that confidence about a Touch Point is linked to the user having clear understanding of the operations of the system as a whole, not only points to the need of suitable User Experience design but even the necessity to engage with the customer over a period of time to build awareness. Reducing the perceived need for physical evidence is at once part of the design solution at the Touch Point Ecosystem level, as well as the efforts to provide visibility of back end processes.

The group of categories that have been clubbed under the higher order category 'Perceptions' would also have implications on design of the User Experience, and further on service design. For example, 'Perceived need to reach or deal with a specific individual at service provider's end for success of the transaction', which can not only be stressful to the customer but could involve avoidable costs, can be tackled through suitable Touch Point ecosystem design, and awareness building.

Certain components of the categories are interesting as well, and may have implications on design of Touch Point user experience. For instance, ability to combine several tasks in one service encounter was a component of 'Convenience' ("I try to avoid going to the bank, but if I have to, I try to combine it with other work ..."). This phenomenon was noted in an earlier study related to citizen – government interactions[25], but the authors labeled it as "efficiency", connecting it with the efforts required to use a channel. However, in the categories that have emerged in the present study, 'costs' are associated with 'conditions' and 'convenience' is linked to 'Perceptions', which appears to be a more appropriate representation. Another interesting component of convenience was ease of finding vehicle parking space!

While this may or may not be in the control of the provider, it is a factor they can (and quite likely do) take into account. Arguably, several categories that were discovered would probably not have been discovered with the use of some other methods. Examples are: user's value system playing a role, strong need for evidence and perceived need to be able to reach a specific individual in an organization. This also points to the fact that experience being a complex phenomenon, the approach of formulating hypotheses and testing them may provide only a partial picture. However, the insights rooted in the subtleties and complexity of the experience can be uncovered with the use of Grounded Theory. It therefore seems to be a suitable method for carrying out research in User Experience domain and worthy of inclusion in the repertoire of methods used by the researcher.

A collateral finding pertains to the methods used. The use of scenarios and critical incidents was found to be effective in giving a focus to the interviews without losing the advantages of the unstructured interview technique. It also, quite likely, helped in reducing the known dichotomy between expressed intent and the actual actions.

The respondents participating in the study were educated, residing in urban areas and having access to multiple Touch Points. While this was an appropriate sample for the purpose of this study, it is likely that the findings could have been different had the sample been drawn from, say, small towns or rural India. As such, the conclusions cannot be generalized. However, since the population similar in characteristics like the chosen sample is large and the insights would surely be relevant in designing User Experience suitable to such kind of people.

The theoretical sampling limit was reached when analysis of six interviews was complete. While the categories and the

relationships that have been observed appear to be valid as they are grounded in the data, further investigation could help enhance the understanding. However, that does not prevent their use in practice, with due caution.

As already suggested, additional interviews and investigation could be conducted in light of the findings for further validation. Similarly, triangulation through literature study can also be done before such an exercise to find whether other researchers have established any of the discovered categories and relationships. Building theoretical sensitivity in this manner could help in additional research to discover new categories and relationships.

Certain categories such as perceived need of a mediator and building and leveraging relationships appear to be related to the Indian context. They could be studied further, as well as to identify what causes them. The insights from such a study could be useful for designing Touch Point ecosystems. As illustrated above, Grounded Theory method did produce important and relevant insights, even though there were some deviations from the ideal application. Similarly, the method proved to be effective in the face of the complexity of the phenomenon being studied, and does seem to hold promise as a useful research method in the domain of User Experience Design.

Annexure A: One of the Scenarios and Choices

High value of the transaction (in this case that of the cheque). The transaction involves user performing his part, followed by actions by some other parties spanning over a few days, which are invisible and not in the customer's control. The process is largely deterministic, with no deviations or latitude for judgment.

I received a cheque of Rs. 200,000/- on a Tuesday. I did not need the money immediately, but did not want to keep the money idle either. So, I decided to deposit it the next day, which happened to be a working day. My firm allows leaving the work place for a couple of hours occasionally for personal work. That Wednesday, however, I had to go early

to office for an important meeting, and there were lot of activities lined up during the day.

- I went to the bank ATM during my morning walk and deposited the cheque in the ATM
- I went to the bank ATM during my morning walk and dropped the cheque in the drop box at the ATM kiosk
- I adjusted my work for an hour to go to the bank branch by an auto. There was a long queue, but I waited and deposited it at the counter
- I adjusted my work for an hour to go to the bank branch by an auto and deposited it in the drop box
- I decided to wait for an earliest day on which I can go to the bank branch and deposit at the counter
- I did something else ...

Category	Concept
Ability to mitigate likely adverse consequences	Creates ability to provide evidence
	Customer takes additional precautions to eliminate adverse consequences in case of transaction failure
	Customers learn good practices from other sources
	Finding ways to reduce potential financial loss, when forced to use a Touch Point
	Need to have evidence. Customer uses alternate means to create evidence of his having done his part of the transaction, as precaution against potential issue in case the transaction fails.
	Sense of comfort after having taken precautions that the customer can take
	Taking efforts to acquire means to reduce adverse impact of failure in transaction and other risks (in this case perceived risk of IT security breach)
Assurance through other means / Touch Points	A supportive use of another Touch Point (SMS in this case) is a positive factor
	Additional Touch Points used by the provider in a supplementary manner satisfy the need to have an evidence
	Assurance provided through other means that transaction will not fail, or there would be no significant adverse consequences even if it fails (e.g. financial loss)
	Feeling of safety due to assurances provided through other means
	Provider uses of another Touch Point to provide confirmation of the successful transaction. The contents of the communication provide the necessary details. The past experience of such a confirmation is an influencing factor.
	Sense of assurance enhanced due to provider's use of another Touch Point in a supplementary manner
	The other Touch points used in a supplementary manner provide the right kind of information to enhance the sense of assurance / reduce anxiety
	The supportive Touch Point provides adequate information about the issue resolution to inspire confidence

Annexure B: Examples of Concepts and Categories

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On Defining Visual Narratives

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Abstract

Visual story-telling is a phenomenon that every society is acquainted with. The term extensively used to refer to visual story-telling in recent times is 'Visual Narrative'. The label 'Visual Narrative' is applied in a generic sense to denote anything from an illustrated story-book to motion pictures. Far from being a trivial term, 'Visual Narrative' is in reality an all encompassing idiom, it is a sub genre of Visual Studies itself. With the advancement of scholarly inquiry in the area of visual and narrative studies, there is a pressing need to establish Visual Narratives (VN) as a distinctive area of study so as to open up sub genres to critical examination. It is our endeavour to present a definition of Visual Narrative and in particular to lobby for the establishment of 'Static Visual Narrative (SVN)', 'Dynamic Visual Narrative (DVN)' and 'Interactive Visual Narrative (IVN) as sub genres of Visual Narratives.

Introduction

Visual Narrative (henceforth—'VN') is a term taken for granted to mean (quite rightly) – a combination of the two words 'Visual' and 'Narrative'. If one tries looking up the definition of the term 'Visual Narrative', chances are that one may not find it¹; and yet VN is a topic under

1 Although the definition of 'Visual Narrative' is not explicitly spelled out; Julia Murray mentions a working definition of 'narrative illustration' as: the pictorial representation of or reference to one or more "events" that occur in a sequence of time and that bring about a change in the condition of at least one character (Murray, 1995:17). As we accept the term 'narrative illustration' as a synonym of 'Static Visual Narrative' we employ the point mentioned by Murray as one of the characteristics of

which intensive research has been happening over the past decades. One may not have heard of a specialized field or department called VN but one most certainly must be acquainted with terms such as – Narrative Art, Visual storytelling, Films, Pictorial stories, Illustrated stories, Comics, Sequential art, History Painting, Animation etc. What binds the above mentioned areas is the fact that they are all essentially explorations into visuals that tell stories. It is our aim in this paper to demonstrate that individual research areas (such as the ones mentioned above) that conduct independent research are in fact various forms of VNs. We thus propose the establishment of VN as a distinct category of Visual and Narrative Studies. Furthermore, we discuss three types of VNs – 'Static Visual Narrative', 'Dynamic Visual Narrative', and 'Interactive Visual Narrative (henceforth—SVN, DVN and IVN) as sub genres of VNs. As part of this paper we also undertake to define VN and its sub categories discussing each with the help of examples. It is our belief that doing this would not only unify the various areas under a single domain but also encourage sharing of knowledge between the sub fields. Moreover, a categorization of this type would open up new areas of research to students and professionals dealing with VNs.

the VN. We refrain from using the words 'narrative illustration' or 'pictorial storytelling' (words synonymously used by Murray) in favor of the much more flexible term – 'Static Visual Narrative'; the justification for which shall be provided further on in the paper.

Search for a word that signifies a visual that tells a story
Let us begin by looking at the meanings of some of the terms used by researchers that imply VNs that are established fields of study² –

Films: also referred to as movie³ or motion pictures. (...) shortened form of moving picture (1896) (Harper, Online Etymology Dictionary). Movies are made up of a series of still photographs, each of which shows a slight change in motion, when projected; they give the illusion of a moving image (Pincus, 1972).

Narrative Painting: has an element of literacy,(...). In a narrative picture, the viewer is seeing a moment in a story that allows the viewer to understand what happened prior to and after the moment caught by the artist (from: <http://www.humanitiesweb.org>).

History Painting: is a term used to describe paintings that focus on a serious narrative or include exemplary actions. In this sense the word history relates to the Italian *istoria* (narrative or story). History painting is not necessarily an accurate or documentary description of actual events. Such works are often large in scale. Their subjects derive from the Bible, mythology, secular literature, or historical events. They can also be allegorical (from the website: National Gallery of Art, Washington DC).

Animation: Animation (from the Latin word, *animare*, to breathe life into) is the visual art of making a motion

2 It is not our purpose here to present an exhaustive list of terms used, thus only those terms that are frequently used have been examined.

3 movie (American informal) a cinema film (The Oxford Dictionary, 1989:534).

picture from a series of still drawings(Encyclopaedia of Irish and World Art).

Pictorial Narratives⁴ : This term is made up of two words – Pictorial (from the word ‘Picture’) and Narrative. Pictorial⁵ – Etymologically the word comes 1646, from the Latin word *pictorius* “of a painter,” from Latin *pictor* “painter,” from pp. stem of *pingere* “to make pictures”. The noun meaning “journal in which pictures are the main feature” is first recorded 1844 (“pictorial.” Online Etymology Dictionary). Narrative – This means to engage in the act of narration.

Sequential Art: A train of images deployed in sequence (Eishner, 1996:6). ‘(...) that deals with the arrangement of pictures or images and words to narrate a story or dramatize an idea’ (Eishner, 2006:5). Eishner uses the term ‘sequential art’ as an art form that has its expression in the form of comic books⁶ .

Comics: from the word ‘Comic’ originating from the Greek *κωμικός*, *kōmikos* “of or pertaining to comedy”. The term derives from the mostly humorous early work in the medium, and came to apply to that form of the medium including those far from comic. In 1996, Will Eisner published *Graphic Storytelling and Visual Narrative*, in which he defined comic (books) as “the printed arrangement of art and balloons in sequence” (Eisner, 1996:6).

4 Term used by scholars such as: Franz Wickoff, ; H.G.Gomrich, ; Whitney Davis, 1992;Virve Sarapik, 2000; Ira Westgard, 2006.

5 pictorial adj: 1. of or expressed in a picture or pictures. 2. illustrated by pictures.
picturen. 1. representation of a person or people of object(s) etc. made by painting, drawing, or photography, especially as a work of art. (1989, The Oxford Paperback Dictionary).

6 See, Eishner, Will, *Comics and Sequential Art*, 2006.

Scott McCloud⁷ defined sequential art and comics as: “juxtaposed pictorial and other images in deliberate sequence, intended to convey information and/or to produce an aesthetic response in the viewer” (McCloud, 1993: 7-9). R. C. Harvey, in his essay *Comedy at the Juncture of Word and Image*, states: “...comics consist of pictorial narratives or expositions in which words (often lettered into the picture area within speech balloons) usually contribute to the meaning of the pictures and vice versa” (Harvey, 2001:76).

Narrative Illustration: the pictorial representation of or reference to one or more “events” that occur in a sequence of time and that bring about a change in the condition of at least one character⁸ (Murray, 1995:17).

We do not suggest that these terms are wrong, but if examined in detail, it will be found that these terms refer to the VN in a limited way. In fact they can be grouped on the basis of particular aspects of the VN, namely:

1) Compositional nature of the VN:

Sequential Art: The word sequential alludes specifically to the aspect of arrangement.

2) With reference to the theme of the VN:

History Painting: The terms ‘History’ refers to the subject matter of the VN; while ‘Painting’ refers to the type of representation technique⁹.

3) Certain characteristic of the VN:

⁷ Scott McCloud in his book, ‘Understanding Comics’ explores the definition of comics, its historical development and the fundamental vocabulary employed by this particular type of VN.

⁸ Julia Murray mentions this as working definition of ‘narrative illustration’.

⁹ Also Religious Painting: where ‘Religious’ refers to the subject matter of the painting.

Comics¹⁰ : Comics have over the years developed a distinct identity of its own with its characteristic sequential nature of the pictures, and the predominance of pictures over words. This feature distinguishes comics from picture books and other illustrated visuals.

4) Representational technique of the VN:

a) Narrative Painting, Narrative Illustration: This term can be divided into two. The first word ‘narrative’ is used to highlight the narrative quality of the visual much like an adjective. Narrative is used as qualifier and is added as a prefix to refer to any visual that has a narrative aspect. While the second word informs us about the graphic or material state of the visual i.e. it could be a painting, an illustration or scroll or panels etc.

b) Painting, Illustration: Many a times visuals are referred to the representation style employed to execute the story¹¹. Painting for example is used with reference to the fact that some form of paint has been used to depict the story. Illustration is used to suggest the visual is figurative or graphic in nature.

c) Pictorial Art, Graphic storytelling, Pictorial storytelling: These terms again stress the pictorial and graphic quality of the visual; while the narrative aspect is suggested to in the second part of the word.

d) Animation: “action of imparting life,” from Latin *animationem* (nom. *animatio*), noun of action from *animatus*, pp. of *animare*. Meaning “vitality” is from 1610s. Cinematographic sense is from 1912 (From Online Etymology Dictionary, Harper, 2010).

5) With reference to the material employed to create the VN:

¹⁰ Comics is the only VN to have come to be known as a separate field in its own right

¹¹ In such cases the fact that it is a narrative is taken for granted.

Film: This kind of VN gets its name from the equipment used to create the VN. The 'film' a rolled strip or sheet coated with light sensitive material used for taking photographs or making a motion picture (film: The Oxford Paperback Dictionary, 1989).

As can be clearly seen all of the above terms are varied aspects of (what we call) the VN¹². While all of the above terms are apt to refer to visuals that tell stories, none of them capture the essence of the phenomenon in question¹³. Thus while they are all according to our definition essentially VNs they (each one of them) are a certain type of VN. The problem with this kind of categorization is that it is very limited in nature and restricts the study of the VN. Moreover, there are problems with each term as they are so narrowly defined. For example, a VN can have a religious theme (subject), could be painted (representation technique) on a wooden panel (medium), using the comics

12 Arriving at the term 'Visual Narrative (VN)':

We were in search of a word narrow enough that gives a holistic description of the phenomenon at hand and at the same time wide enough to include a wide variety of visuals that told stories. The two terms that came close to the effect we were trying to achieve were – Pictorial Narrative and Visual Narrative. We found the word 'Pictorial' limited to describing only graphic images whereas we wanted to include narrative sculpture and visual stories occurring on other objects such as bowls, panels etc. as well. Another reason that strongly affected our decision to favour the word 'visual', is the fact that the term 'pictorial' does not take into account 'text' that is sometimes part of the image. Examples of these kinds are comics, illustrated story books etc. Therefore we chose the word 'visual' over 'pictorial'; thus achieving the flexibility we were looking for. But in essence both the terms Visual Narratives and Pictorial Narratives can be used as synonyms if one wants to refer strictly to VNs that are purely pictorial in nature.

13 This can be likened to the story of the Blind men and the Elephant. While each of the Blind men was right in describing what an Elephant looked like all of them were in some way also wrong.

style and be executed in the form of an animation film. Thus we can have a combination of aspects in a single VN. This proves that the categories presently in use are not watertight. A single VN can be classified under multiple terms depending on the presence of a particular aspect. But this does not guarantee that the other aspects are absent. It is as a remedy to this shortcoming that we propose the following

- 1) Use of the term VN as a category at the first level to indicate any kind of visual that has narrative content.
- 2) Based on the functionality of the VN they can be categorised into A) SVNs, B) DVNs, C) IVNs; at the second level.
- 3) At the third level, one can be very precise and refer to a certain feature of the VN e.g. film, history painting, picture book, etc.

With this aim in mind we set about defining VN and its sub genres in this paper. At this point we would like to mention the reason we feel it necessary to define the VN and its sub types.

Rational for defining VN and its sub genres

The obvious question that arises is justification for the recognition of the VN as a specialized field of investigation and its sub genres. One of the main reasons why this integration is very much needed is the fact that the various categories under study are in reality one and the same phenomenon (as has been proved earlier in the paper). Acknowledgement of the VN as a unified body of investigation will facilitate cross-pollination of ideas and methodologies thus expanding the knowledge base. Once the VN is accepted as an independent body its structure so far illusive immediately surfaces. This opens up a new path of exploration that of the VN as an entity in itself. The VN can now be studied at the ideological and structural level. The SVN, DVN and IVN in turn achieve independent entity status and can be studied at various levels. An

in-depth study of each type of the sub genres of VNs can be conducted and results compared.

VNs have up to now been investigated from various perspectives e.g. art historical, semiotic, archaeological etc. What has been lacking since a long time is the investigation into what makes a VN. What are its various components? How does it function? The defining of the VN as a conceptual body having a structure lends itself to structural examination that helps answer those questions; the answers to which will lead to further the knowledge of the construction and a better understanding of the VN. This information will be of immense benefit to students and practitioners of visual communication alike. Having said this we now move towards examining the concept of VN.

The Visual Narrative (VN)

The distinctive feature of the VN is the presence of a story. In order to form a conclusive definition & establish the term 'Visual Narratives' as a distinct genre of visual studies; we need to support our claim by specifying the manner in which we use the terms Visual, Narrative and Story.

Visual: As to what comprises a 'Visual' is quite clear and agreed upon i.e A Visual is something that can be seen using the human eye. We accept the dictionary meaning of Visual as related to the sense of sight.

Narrative / Story are terms that seem to have been used interchangeably as synonyms of each other. Our first task therefore is to relook at the terms Narrative and Story.

Narrative: Hayden White pointed out in his book *The Content of the Form* that the word "narrative" goes back to the ancient Sanskrit "gna", a root term that means "know" and that comes down to us through Latin words for both "knowing" ("gnarus") and "telling" ("narrow") (Cited in The

Cambridge introduction to narrative¹⁴, H. Porter Abbott, 2000: 10). There have been debates as to what constitutes a narrative without a concrete conclusion being reached. We shall therefore here enumerate only those meanings of the word 'Narrative' in the sense we feel is appropriate in the given context. Simply put, narrative is the representation of an event or a series of events (Porter Abbott, 2000:13). Murray in her paper mentions that most scholars agree 'that a fundamental marker of narrative is action, which produces change (...). Another fundamental element of narrative is time (Murray, 1998:605). Accordingly we will primarily use the word 'Narrative' - meaning - to tell a story.

Story: According to the dictionary meaning a story is - a description, either true or imagined, of a connected series of events and often, the characters involved in them (Cambridge International Dictionary of English, 1995).

Difference between a story and a narrative: A distinction is made by Hawthorn who defines a story as a sequence of events. Narrative according to him, focuses our attention on to a story, through the direct mediation of a 'telling' which we both stare at and through, which is at once central and peripheral to the experience of the story, both absent and present in the consciousness of those being told the story (Hawthorn, 1985). Scholes, Phelan and Kellogg suggest two distinguishing characteristics for a literary work to be termed as narrative: the presence of a story and a storyteller (Scholes, Phelan and Kellogg, 1988:4). 'The difference between story and narrative discourse is, (...) a difference between two kinds of time and two kinds of order' (H. Porter Abbott, 2000:16). Seymour Chatman makes the difference between Narrative and Story to be that of 'time' and 'order' - what he calls the "chrono-logic". 'Narrative

¹⁴ See, Brian Richardson, 2000, *Recent Concepts of Narrative and the Narratives of Narrative Theory*.

entails movement through time not only “externally” (the duration of the presentation of a novel, film play) but also “internally” (the duration of the sequence of events that constitutes a plot). The first operates in the dimension of narrative called Discourse..., the second in that called Story(...)(Chatman,1980). Brian Richardson marks the difference in the order of occurrence and order of presentation, which can be read as the distinction between story and narration (Richardson, 1987:300)¹⁵. In conclusion we can say a ‘Narrative’ is the representation of a story while a ‘Story’ is a sequence of events.

Defining a Visual Narrative

Visual Narrative can be defined as a visual that essentially and explicitly narrates a story; where –

Visual signifies – something that can be seen using the human eye.

Story signifies – a series of events linked by causality, temporality or sequence or the order of occurrence.

Narrative signifies – the act of telling a story or the story itself or the order of presentation.

Fig. 1 is an example of a Visual Narrative (Puss in Boots). The story that forms the content in this VN is ‘Puss in Boots’. It is narrated over a scenes and one of these scenes is what we see in the image.

Visual Narrative (VN) is synonymous with visual stories, narrative images, picture stories, narrative pictures.

The characteristic features of a VN are:

1. The presence of a story is the most essential feature of the VN. The story could belong to any genre: fiction, mythology, fairy tale, folklore, fables, religious stories, etc. The VN in fig. 1 is a fairy tale revolving around a magical cat who wears boots called ‘Puss in Boots’.



Fig. 1: An example of a VN– a scene from ‘Puss in Boots’¹⁶

2. The visual is constructed with the idea of communicating a story to the onlooker. For e.g. the aim of the scene in fig.1 is to convey to the audience a visual description of an event that occurred in the story; in this case the manner in which the king and queen received the extra-ordinary cat at their court.

3. There is a presence of actors (participants). An Actor is a character in the story who performs an action. It is the most essential component of the VN. The most commonly used method of recognizing an SVN is through identifying the actor or the situation that the actors in a visual build up. If the actor is absent from the SVN the visual would be

¹⁶ Image taken from the book, ‘The Mini Treasure Chest of Great Fairy Tales’; published by Tormont International Ltd. Hong Kong. Illustrations: Tony Wolf, Piero Cattaneo. The copyright of this image lies with Dami Editore, Italy.

¹⁵ Richardson makes this distinction in the context of drama.

incapable of representing an event¹⁷ . In fig.1 we see the King, Queen and Puss in Boots, in addition we also see two courtiers – these are the actors (participants) of the visual story.

4. The VN has a ‘universe¹⁸’ of its own. The participants in fig. 1 exist in a virtual story world i.e. a universe that mimics the real or imagined world but is different from the viewer’s world. The participants of the story exist in this universe that has its own time deixis and spatial dimensions.

5. A VN could be expressed on any medium e.g. paper, stone, an electronic device, etc. Demonstrating this idea are a number of VNs displayed on various materials Fig.s 2a – 2d.



Fig. 2a: VNs can be viewed on iPods

17 “Events” occur in a sequence of time and that bring about a change in the condition of at least one character (Murray, 1995:17).

18 It is a world that exists within the visual narrative that is represented; it is there that a coherent grouping of people and things dwell, who are systematically connected in place and in action. Etienne Souriau explains the concept of ‘universe’ in the paper titled ‘Time in the Plastic Arts’.



Fig. 2b: VN on a silver bowl¹⁹



Fig. 2c: VN on paper²⁰

19 Leningrad, Hermitage. Silver Bowl: Scenes from Euripides. Image from the book: Kurt Weitzmann, ‘Illustrations in Roll and Codex: A study of the origin and method of text illustration’, 1970, Princeton University Press.

20 A page from a comic book: Edge, Way of the Rat, published by CG Entertainment, September 2002. The copyrights for this images lies with Cross Generation Entertainment, or CrossGen, was an American comic book publisher that operated from 1998 to 2004.



Fig. 2d: VN in stone²¹

To elucidate further we can say that any visual that is represented with an idea to communicate a story to the onlooker qualifies as a VN. In some cases the onlooker may fail to relate to the story presented due to a number of reasons such as differences in culture, context, language, etc. The fact that the onlooker does not know the story does not nullify the narrative quality of that visual. A good

21 This SVN represents the story of Ravana attempting to shake Mount Kailasa a pillar in Virupaksha Temple, Pattadakal. Photo posted by Prof. Harihara Subramanian.V at <<http://stonestories.blogspot.com/>>.

example to illustrate the point being made is a sculptural relief on a Hindu temple. A person coming from a different religious background may not be able to identify the story depicted but the sculpture will still be called a VN as it does tell a story. Similarly certain cave paintings could be VNs as they may have had oral stories (for instance – about how a group of hunters succeeded at capturing a particularly difficult prey) attached to them which are now lost.

By defining the VN we wish to mark the peculiarity from other visuals where a story can be imposed onto the visual. Visuals that fall under the VN Category are-

1. Visuals where the story depicted is expected to be so well known within the context that it does not require an accompanying text. For example murals & sculptures in temples, churches, paintings / engraving on objects.
2. Visual where the story accompanies the visual in written or aural form. e.g. comics, animated films, illustrated books, motion pictures.

Plausible Early Beginnings of VNs...

Where and how did visual story telling emerge has been lost in the looms of time²². The desire to commemorate significant events and the idea of pictorial depiction of a story existed by the end of the prehistoric period (Perkins, 1957: 54). We can speculatively envisage a scenario of a cave man returning from a hunt, narrating the way he brought down his prey to a group of his clans people round a fire²³. He takes a bit of coal and makes

22 Will Eisner in his book on graphic storytelling, gives an interesting account of the story of visual story telling. See, Eisner, 1996, 'Graphic Storytelling and Visual Narrative', Poorhouse Press, NJ.

23 Although VNs developed in various parts of the world, they did so in various forms, in various mediums and on different scales. These were dependent on many factors such as for instance availability of natural material for use. Perkins mentions – 'The Babylonian artists thought always on a small scale, and

some markings on the cave wall to illustrate his point and help his audience imagine the way he went about it. Thus primarily the visual narrative works as an aid to the viewer to visualize the way the event happened.

Plausible reasons for the VNs to come into existence could be:

To explain the manner in which an event took place²⁴

To give an idea of what the characters looked like i.e. size, shape, and scale²⁵

To express in visual form, as a historic record of the event²⁶

To serve as a social visual message to the masses²⁷

As a medium to reach people who were illiterate (those not familiar with the alphabet)²⁸.The VN due to its visual quality makes a strong impact and has been used extensively over the years. Undisputedly a powerful medium of expression,

the vehicles of artistic expression were portable objects: vases, plaques, stelae, cylinder seals. Large scale mural relief work, such as that known in Egypt from the Old Kingdom on, was impossible in alluvial Babylonia, which had no suitable stone.' (Perkins, 1957:54)

24 An excellent example of a VN that functions towards this end is the graphic novel.

25 Examples of VNs that have a descriptive aim are paintings that show Narashimha or Durga.

26 The 'Trajan Column' is a good example of this kind. Erected by Emperor Trajan himself it '(...) commemorates his war-like achievement viz., the conquest of Decebalus and the annexation of the whole of Dacia to the empire as a Roman province, after two difficult and bloody wars' (Pollen, 2005:5). See John Hungerford Pollen, *A Description of the Trajan Column*, 2005, Elibron Classics, London.

27 The sculptures at Bharut that tell Jataka tales were created with this aim in mind.

28 Pope Gregory the Great 'believed that the mimetic aspects of pictographic forms made stories, and the ideas they conveyed, universally communicable' (Lavin,1990:1)

they have their pros and cons. Some of the points in its favour is the capability to mimic the event, conditions, characters in great detail and as close to the truth (real or imagined) as possible. Being visual it has a high reach-out rate as people who are illiterate or do not know to read a particular script can still make some sense of the visual.

On the other hand VNs like other types of narratives are deeply rooted in the cultural and social practises. Due to this reason it cannot be a completely universally understood language. Designers employ culture specific artistic codes developed to represent the story in a visual form. These codes need to be decoded by the viewer to read into the VN. One requires an understanding of the norms, beliefs and functioning of the culture to which the VN belongs in order to make sense of it. Another drawback of the VN lies in the very fact that it is visual. Since purely visual signs can have multiple readings, one needs to know the story represented in the visual to interpret the VN correctly.

VNs have existed and continue to exist around the world. These are being explored from diverse perspectives within the domain of visual studies. There have been pioneering investigations in the area of VNs but as separate and isolated subjects. By defining VN as a domain we can streamline these bodies of work and integrate them into a broader framework. Prominent topics studied as VN are comics, narrative sculptures, story-book illustrations, graphic novels, animation and live action films. All of the above mentioned topics share a commonality of being visually communicated stories. VNs as one can see forms a large area, there is a dire need to categorize them so as to open up more areas of investigation.

There exists a distinction between 'arts of time' and 'arts of space'; a view to which many scholars subscribe. The

‘arts of space’ produce static or fixed images that are two dimensional (painting) or three dimensional (sculpture); they thus lie outside the time category. They are in essence structurally distinct from music and poetry, which develop within a physically prolonged time (Francastel, 1967:182). This difference is also echoed in Indian though ‘The evolution of the world means a course of constant change and modification due to this change. They are of two kinds: temporal (*kriyā vivarta* = action modification) and spatial (*mūrti vivarta* = image modification). The former indicates the state of continuity (*sādhya*) and the latter the state of stagnation (*sidha*). Pictorial art or a material image (*mūrti*) belong to the order of spatial modification because it is static and limited in extent, where as language (and poetry) belongs to the order of temporal modification’ (Sukla, 2000: 235)²⁹. The argument of the nature of temporality between the arts of time and space was first brought up by Lessing in the context of poetry and painting. Both music and graphic novels handle time, but in a radically distinct manner. It is with reference to this nature of time that discussions began in earnest³⁰.

Another point of distinction is the manner in which we perceive images. In the visual world, there is a difference between passive reception and active perceiving (Arnheim, 1969: 14). Our eyes do very different things when we look and when we see, and both are necessary for visual problem solving (D. Roam, 2009:74). While viewing a film the story

29 He goes on to state - “Painting, for its very medium and the nature of its modification is a limited sign system, and is therefore inferior to poetry, both the means (language) and manner (narrative) of representation of which indicate Time in its eternal continuity” (Ananta Charana Sukla, *Art and Representation: Contributions to Contemporary Aesthetics*, 2000:235), a view strikingly similar to that presented by Lessing in his *Laocoon*.

30 For a though provoking view point on the nature of time in VNs see Etienne Souriau ‘Time in the Plastic Arts’.

unfolds in front of the viewer, in the case of the comics the task of unfolding the story is left to the viewer. Both kinds of VNs are planned in different ways using dissimilar mediums. Mc Cloud elucidates the difference between comics and film –‘Each successive frame of a movie is projected on exactly the same space –the screen—while each frame of comics must occupy a different space. Space does for Comics what Time does for Film’ (McCloud, 1993:7). Perhaps the best approach to differentiate between the two kinds of narrative is described in the following words: ‘The filmmaker says ‘look I’ll show you’ the space maker says ‘here I’ll help you discover’ (Rheingold, 1991, cited in Bolter and Grushin, 2000: 162, cited in *Visual-Narrative and Virtual Reality*).

Göran Sonesson describes ‘the continuous sequence of moving pictures, as in a film, and, sometimes, on television’ as ‘temporal series’ and ‘the temporal set’, ‘ which consists in a number of static pictures united by a more or less common theme, as in comic strips, graphic novels and photo novels. Here, temporal links are partly mimicked by traditional reading order, and partly projected by the reader.’ (Sonesson, 1995)³¹

31 In addition to the two kinds of Visual Narratives, Sonesson also talks about a third kind what he calls the multi-phase picture, which is a single, static picture, containing persons and events which are known to represent various phases taken from the same event series, or action scheme. Thus, the temporal link is projected onto the picture, solely from our knowledge of the story, from the title, or from recognition of logical or physical impossibility (as in the case of things you cannot do at the same time), etc.

See, Göran Sonesson, *Mute Narratives: New Issues in the Study of Pictorial texts, Interart Poetics*. Acts of the congress “Interart Studies: New Perspectives”, Lund, May 1995. Lagerroth, Ulla-Britta, Lund, Hans, & Hedling, Erik, (eds.), *Rodophi*, Amsterdam & Atlanta 1997; 243-252.

We concur to the distinction made on the basis of the nature of temporarily and the difference in the manner of viewing VNs. Accordingly, we assign the term 'Dynamic Visual Narrative (DVN)' to the former and 'Static Visual Narrative (SVN)' to the later. The limits that have been indicated are physical; it is with respect to this facet that we use the word 'dynamic' and 'static' to emphasize the distinction³². Additionally we assign the term 'Interactive Visual Narrative (IVN)' to the third type of VN, on the basis of extensive viewer interaction with the VN. Having transiently mentioned the rationale on the basis of which we categorize VNs into A) SVN, B) DVN and C) IVN let us examine each of these in detail.

A) Static Visual Narrative (SVN):

Contrary to the term 'Static', SVN's do possess dynamism. But this is a different sort of 'dynamism'; the one that unlike the DVN is not present itself as a principle but one that demands of the audience to supply it. The difference lies in the perceptual experience of temporal movement (Etienne, 294; Gottlieb, 1958; Gombrich, 1964; Le Poidevin, 175). In a DVN, the film unfolds in successive moments, in the case of the SVN the visual is frozen but the viewer's eyes and mind move on³³. A good example to illustrate the movement of the mind is an illustration from Raymond Briggs's 'Father Christmas goes on Holiday' fig.3. In the visual we are presented with the principal actor- 'Father

32 Marie-Laure Ryan proposes a classification of Narrative Media, she distinguishes a transmissive and a semiotic definition referring to medium as a channel and a means of expression and communication. Classifying media into Temporal, Spatial and Spatio-Temporal categories. She makes the distinction between Visual / Static (which corresponds to SVN) classifying it under the Temporal category and Visual / Kinetic (which corresponds to DVN) which she places under the Spatio-Temporal category. See Marie-Laure Ryan, *On Defining Narrative Media*, 2003.

33 See 'Time in the Plastic Arts' Etienne Souriau

Christmas' getting out of his caravan and jumping into the lake only to discover that it is cold. While the image illustrated appears to be frozen in time, our mind (perception) makes the leap and completes the actions³⁴. It is due to this faculty that we convince ourselves the actor shown in various actions, are not many people who look exactly the same enraged in various activities, but is a single character in a sequence of moments. This would be sufficient to prove to us that our minds and imagination is indeed capable of performing such tricks.

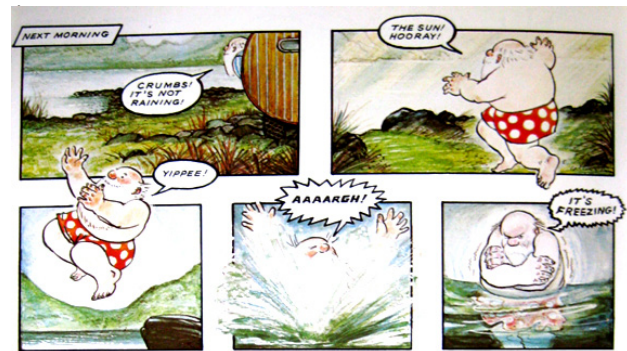


Fig.3: Man jumping into a lake and shivering³⁵

Our minds can imagine and carry out mental exercises (such as, imagining a pink elephant wearing gumboots flying upside down) quite effortlessly³⁶. Also the whole

34 This example has also been used by Hernadi, Paul. 'On the How, What, and Why of Narrative', *Critical Inquiry* 7.1, *On Narrative* (1980): 201-203. Arheim, Rudolf, *Art and Visual Perception: A Psychology of the Creative Eye*, Berkeley: University of California Press, 1974.

35 Image from 'Father Christmas goes on Holiday' by Raymond Briggs

36 Lessing, ed. McCormick, originally published, 1766, *Laocoon: An Essay on the Limits of Paining and Poetry*, John Hopkins Press, London.

school of ‘mental imagery’ is built around this ability of man to - ‘see(ing) in the mind’s eye’. This phenomenon can take place because our imagination, unlike our perception, is under the control of our will (and experienced as such) (Thomas, Nigel J.T., 2010). It is this power of visualization that is called upon to appreciate an SVN

Lessing in his book³⁷ mentions James Harris (1709-80) (as one of the foremost scholars to suggest the possibility of conveying temporal movement through images says about painting -‘Painting can imitate only by means of colour and figure. It can represent only one moment in time. Although it is motionless it can indicate motions and sounds as well as actions which are known (i.e. history)’ (Lessing, 1766: xvi.)”. We concur to the possibility of representing temporarily in a static image and thus propose the Static Visual Narrative. The characteristic features of the SVN are:

1. The SVN executed on a medium occupies surface area. For example an illustrated comic book runs over many pages, or a mural painting may cover an entire wall. The viewer has to unravel the story by exploring the surface area covered by the visual. Thus the story unfolds across space.

2. In the case of the SVN the image is fixed on the surface of the medium. That is to say it remains materially unchanging. Le Poidevin defines ‘A static image (as) one that represents by virtue of properties which remain largely unchanged throughout its existence’ (Le Poidevin, 1997:175). For example once a story has been painted or printed on a piece of paper it does not undergo much change except for maybe fading with time.

3. SVN’s bank on the spectator’s prior knowledge of the narrative. Only then can the viewer fully enjoy reading

the SVN, as the intent of the visual narrative is to engage the spectator within it. ‘Perception’ and ‘Memory’ play an important role in this respect. The viewer has to recall the event in story and match it to the event portrayed in the SVN. The spectator already knows what has happened (the past) and what is to come (the future) but engages in unravelling the SVN as the designer has presented³⁸.

4. The visual is fixed but the viewer or the viewer’s eye is mobile. The SVN is viewed by a moving spectator, who finds connections between juxtaposed scenes that communicate a meaning. The spectator turns the pages or stands back in front of a sculptural panel; it is the eye that moves and explores the visual. Souriau illustrates this point by citing the example of viewing a statue ‘ His (the viewer’s) movement around the statue brings to view, as it were, melodically, the various profiles, the different projections, shadow, and light; thus the most complete appreciation of the aesthetic complexity of the work is gained only by the moving spectator’ (Souriau, 1949:295).

5. The viewer of the SVN decides the speed at which to view the image. The SVN by the fact that it is fixed permits the spectator to travel around the visual at leisure, allowing for pauses at any given point for as long as is desired or quickly skimming through the visual.

6. In an SVN the order of viewing is not determined; the spectator decides the order in which to view the SVN. A choice can be made as to where to begin viewing the SVN. Having known the story, one can decide to begin viewing the story from any given point in the narrative and go backwards or forwards accordingly. One can even begin

37 Lessing, ed. McCormick, originally published, 1766, *Laocoon: An Essay on the Limits of Painting and Poetry*, John Hopkins Press, London.

38 Professor Hernshaw refers to this as ‘temporal integration’, the bundling together in one extended stretch of time of memories and expectations (as quoted by E.H. Gombrich, 1964).

with the end and view the whole narrative in a flashback kind of manner. In other words the SVN can be read from beginning to end, vice versa or begin in media res as per the preference of the viewer.

7. The viewer is in full control of the contemplation time or as Goswamy refers to it 'the ruminative viewing' i.e. time taken to carefully regard a work of art (Goswamy, 1998). The spectator is in control of the time taken for viewing the SVN.



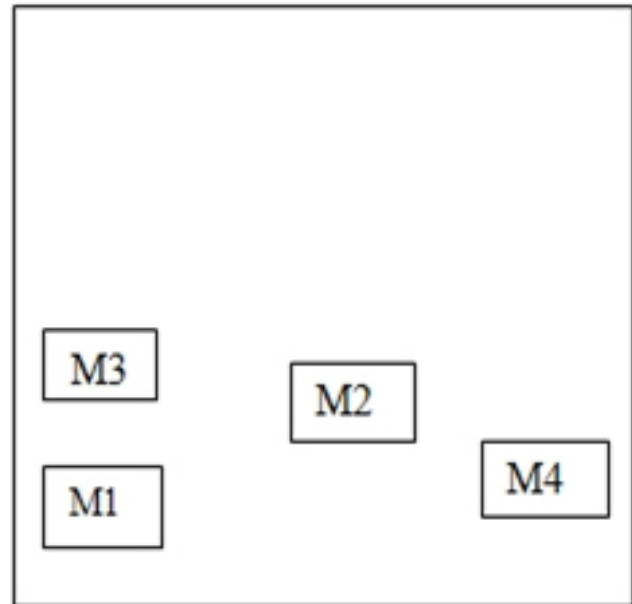
Having explored the SVN, we now move towards the DVN.
8. Perception of movement in the SVN results from the active participation of the spectator. The viewer has to look

39 Panel from Lorenzo Ghiberti's "Gates of Paradise", Florence Baptistery, Italy. Image Source -Web Gallery of Art.

at the SVN recall the story and engage in the process of narration. The SVN makes great demands on the viewer's 'Imagination'. The beauty of the SVN is that it only provides cues to the story in the form of visuals. It is up to the viewer to use those cues as a base to build the narrative.

An excellent example of a SVN is a panel from the Gates of Paradise that represents the story of Adam and Eve.

Show in the SVN (Fig.4), at the left bottom corner, we see God in the act of creating Adam (moment 1 - M1).



- M2). Show in low relief towards the left is Adam and Eve being tempted by the Devil in the form of a snake (moment 3 - M3). Finally on the right side, we see the couple being thrown out of the Garden of Eden by the angels on the orders of God (moment 4 - M4). Broadly speaking the narrative flows from left to right, but the viewer can read

the narrative from any point moving back and forth in the intrinsic story-time.

B) Dynamic Visual Narrative (DVN)

Explorations to add movement to frozen images had been the pursuit of many people⁴⁰. The real breakthrough came in 1890 with the invention of a motor-powered camera that could photograph motion pictures - called a Kinetograph by W.K.L. Dickson (Tim Dirks). In early January 1894, The Edison Kinetoscopic Record of a Sneeze (aka Fred Ott's Sneeze) was one of the first series of short films made by Dickson for the Kinetoscope viewer (ibid). Thus, was born the Dynamic Visual Narrative.

By assigning the term Dynamic to this category of VNs, we refer to the ability of constantly changing images that is characteristic of this type. A movie (animation or live action) typically consists of a number of still images that is run at high speed giving the impression of temporal movement⁴¹. The story is constructed before the eyes of the spectator. Actors, scenes, duration of the event, actually physically move in time; albeit in a linear fashion. The

40 The invention of the Thaumatrope (the earliest version of an optical illusion toy that exploited the concept of "persistence of vision" first presented by Peter Mark Roget in a scholarly article) by an English doctor named Dr. John Ayrton, Paris in 1824. In the 1830s, moving images were produced on revolving drums and disks with independent inventions by Simon von Stampfer (Stroboscope) in Austria, Joseph Plateau (Phenakistoscope) in Belgium and William Horner (zoetrope) in Britain. See - The History of Film - <http://www.filmsite.org>.

41 Films are made up of a series of individual images called frames. These images are shown rapidly in succession, as a result of which a viewer has the illusion that motion is occurring. The viewer does not see the flickering between frames due to an effect known as persistence of vision. The eye retains a visual image for a fraction of a second after the source has been removed. Viewers perceive motion due to a psychological effect called beta movement. (ibid).

visual is projected on a flat surface (Fig. 5) or on a display screens. In the case of DVNs visuals are replaced by new visuals at the same display space.



Fig. 5: A projected DVN



Fig.6: A metaphor of a cinematic experience⁴²

In other words the physical screen space remains the same, the images projected on it keep changing. Slavoj Žižek

42 A still from the movie *Possessed* (1931; Director: Clarence Brown; Joan Crawford, Clarke Gable).

gives an interesting metaphor to express what he calls – ‘the magic of the cinematic experience’⁴³ (Žižek, 2006). He compares the cinematic experience to be like that of a person standing in front of a passing train. The viewer is in a fixed spot, the train moves in before her and she can see what is going on inside the train through the windows⁴⁴. Žižek demonstrates this with a clip from the film ‘Possessed’ where the actor stands in front of a train as it passes slowly by her allowing her a view of the happenings at the various windows of the many compartments (Fig. 6).

Characteristic of a DVN are.

1. The visual is constantly being replaced by new visuals on a stationary screen, moving the story ahead. Thus the story unfolds over time.

2. A DVN is composed of many still images that move at a high speed in a set sequence once they are given the command to move. The visual does not remain fixed to the screen unless paused intentionally. Thus the visual is in a state of constant motion.

3. In the case of the DVN, the story unfolds over time and the viewer need not know the story beforehand to make sense of the visual. The viewer (through the progression of the narrative) is introduced to the characters and is briefed about the background and circumstances of the story. The plot is revealed as time progresses and a narrative is woven

43 Slavoj Žižek explores a number of films from a psychoanalytic theoretical perspective in a two-and-a-half-hour documentary directed and produced by Sophie Fiennes. The film *The Pervert’s Guide to Cinema* (2006) is scripted and presented by Slavoj Žižek himself.

44 One cannot but notice the similarity in the form of a train having many windows and a film reel with frames.

sometimes using devices like flash-forwards and flashbacks, as in the case of the movie ‘*Memento*’⁴⁵.

4. The DVN moves in time while the viewer watches from a more or less fixed location. In other words the viewer views the film from a fixed position i.e. in front of the screen.

5. Which event should unfold in how much time is pre decided in a DVN. Progression of the narrative is due to an automated process that moves the film further in time. The viewer has limited control over the time one can spend viewing each event of the narrative in a DVN. The control is only limited to rewind or forward. In other words the viewer has no control over the pace of the film; it is fixed, constant, precisely measured and determined by the creator. Although experiments involving ‘interactive cinema’⁴⁶ have been tried where the audience take an active role in the unfolding of the plot, but it has been limited to determining the direction in which the story moves.

6. The spectator has no say in the order the events of the film unfold. The sequence in which the events unfold is set.

45 *Memento* – (2000; Director: Christopher Nolan).

46 According to an article about the latest in film technology and cinema viewing – the German movie, *Last Call*, is the first ever interactive horror movie. When you go into the theatre, you text your phone number to a speed-dial database. During the movie, the protagonist makes a phone call to a random audience member and asks their advice. “Should I go up or down?” “Left or right?” “Should I help the creepy man wrapped in bandages, rocking back and forth on the floor, or should I look out for myself?” Voice recognition software means the character identifies what the audience member wants them to do and follows his or her instructions. See article – *Horror Movie Takes Direction from Audience*, <http://www.tomsguide.com>.

The viewer has no choice but to wait and watch how the story progresses.

Sometimes the whole narrative goes back to the start point and begins to unfold again from a different point of view like in the movie 'Run Lola Run'⁴⁷. The flashbacks, flash-forward's etc, happen only in 'narrative time' as far as real time is concerned it has progressed in a linear fashion.

7. The time of contemplation exits but is cut short as the visuals in a DVN change frequently. This just about gives the viewer the chance to update oneself on the progression of the plot. Being preoccupied with this though; the contemplation time is something that a viewer snatches whenever possible while the DVN is in progress.

8. Perception of movement results from the physical change of visuals over time.

An important characteristic that distinguishes the DVN and makes it stand apart from the SVN is its ability to incorporate sound. Having looked at the DVN let us now turn our attention to the IVN.

C) Interactive Visual Narrative (IVN)

Rapid technological advances in the 20th century led to the evolution of yet another type of VN. As with the SVN and DVN, Interactive Visual Narratives (IVNs) are those, which fulfil three conditions – 1) that it is essentially visual in nature, 2) has a narrative aspect to it and 3) involves interaction from the viewer. Thus IVNs are a distinct category from interactive stories that could be only text based or oral narrative based.

The IVN began with the invention of the virtual space and navigation systems to access it. Beginning with the humble 2D animation of events as the viewer clicks a button to move ahead, IVN has now moved into the world of augmented

reality where the viewer becomes part of the story. Here, we find a combination of characteristic of the DVN and the SVN. While in the DVN the visual is preset to move at a given speed in a predefined manner; in the SVN the visual lacks mobile capacity. In the IVN, one can experience the SVN which has dormant dynamic capability that can be activated on the intervention of the viewer. Thus the IVN can behave like the SVN or the DVN or can be composed with features of both SVN and DVN as designed by the creator. Additionally, like the DVN the IVN has the ability to incorporate sound and movement in virtual story space.

Let us take a look at the characteristic features of the IVN.

1. Although the IVN essentially unfolds across time as it is to be viewed through the medium of a screen, it has the possibility of being designed as a SVN and thus unfolding in space as well. For example the IVN can be paused by the viewer in order to view the visual that can be designed as a SVN.

2. The visual in an IVN can be designed to behave like an SVN at sometimes and the DVN at others. For example one event of the story may be rendered as an SVN and another as a DVN.

3. In an IVN the viewer in some cases may need to know the story beforehand. It is also possible for the viewer not to have an understanding of the story as the viewer explores the plot as she moves on.

4. The IVN has the mixed possibility of 1) being frozen in time while the viewer moves, 2) moving in time while the viewer watches from a more or less fixed location and also 3) moving with the viewer (as the case when the viewer plays the role of a character). The distinguishing feature of the IVN is the possibility of the viewer to interact with the visual. There is a whole range of IVN's that exist today that

⁴⁷ Run Lola Run – (1998; Director: Tom Tykwer).

has various levels of viewer interaction. On one end of the spectrum is the IVN where the viewer interaction is limited to moving from one event to another, as in fig. 7, and on the other end is the total story experience where the viewer enters into the story world as a character and navigates through the plot, as in fig. 8.



Fig.7: An IVN where the viewer controls the movement from one event to the next⁴⁸.

5. As the progression of the narrative is due to viewer intervention, the viewer makes a choice with regards to the pace of the unfolding of the story.

6. With regards to the order of unfolding of the story there are three possibilities that can occur – 1) if the IVN appears like an SVN, then the viewer is free to make a choice in arranging the sequence of events 2) if the IVN is presented in the DVN form then the viewer has no say in the order of appearance of the event and 3) the IVN can also allow the viewer to make a choice of the order in which the events of the story unfold.

48 A screen shot from BBC's site CBeebies - <http://www.bbc.co.uk/cbeebies/>



Fig.8: An IVN where the viewer plays a character in the story⁴⁹.

7. The time of contemplation varies in the IVN. Sometimes the viewer can mull over a part of the visual for as long as one desires, at other times the viewer may have to act fast.

8. The perception of movement in an IVN can be caused by the participation of the viewer (if the IVN is designed as an SVN) or the changing of visuals (if the IVN is designed as a DVN). Additionally, the perception of movement can be actual if the viewer is part of the story.

The launch of the application for the Apple iPad – an interactive book called 'Alice in Wonderland for the iPad' earlier this year⁵⁰ is a pointer towards the direction in

49 A screen shot of the 'Samantha Swift and the Golden Touch Game. About the game: On a quest to recover Alexander the Great's Scroll of Wealth, archaeologist and adventurer Samantha Swift realizes that there's more to this mission than she first thought. Now she's racing against the clock to keep ancient powers from falling into the wrong hands! Travel to exotic locations as you discover the ancient secrets and mystery shrouding the famed Golden Touch!. Source: <http://www.shinegame.com>.

50 Alice for the iPad-Lite: Atomic Antelope, Release Date: April 01'10; source - <http://apps.ipad-magic.com> accessed 21 June'10.

which the future of VN is shaping. (...)Atomic Antelope embellished the pages with interactive, Monty Pythonesque animations that move when you touch or tilt the iPad (Dahliquist). The USP of the application of the laws of physics and gravity to the characters of the story opens new avenues of thought. Another feature to take note of is the possibility of experiencing the story differently every time one goes through it. With the advancement in technology IVN can transform the whole visual narrative experience. In conclusion we present a table marking the distinguishing characters of the SVN, DVN and IVN.

Distinction between DVN, SVN & IVN

As we have seen VNs can be categorised into three major types –SVN, DVN and IVN. In the table below we will mark the distinguishing characteristics of each as an aid to identifying each type.

Visual Narrative			
Distinguishing Characteristics	Static Visual Narrative (SVN)	Dynamic Visual Narrative (DVN)	Interactive Visual Narrative (IVN)
Manner of unfolding of the story	Unfolds in Space	Extends in Time	Extends in time with latent possibilities of unfolding in space
Visual appearance	Visual is fixed on the surface of the medium	Visuals are replaced in rapid succession at the same space	Visual appears to be fixed but can be replaced by visuals changing in rapid succession on trigger
Knowledge of the story	SVN's bank on the prior knowledge of the story	The viewer does not need to know the story prior to viewing	Viewers may sometimes need prior knowledge of the story; at other times it may not be necessary and in some cases the viewer decides how the story moves forward
Visual and Viewer Interaction	The visual is fixed but the viewer (imagination) is mobile	The visuals move but the viewer is at a fixed location	Visual can be fixed or mobile, likewise the viewer can be fixed or moving or even take on the role of a character in the story
Speed of Viewing	The spectator can decide the speed of viewing	Speed of viewing predetermined by creator of the DVN	Sometimes viewer can determine the speed of viewing, at other times the speed is predetermined
Sequence of Viewing	The spectator can manipulate the sequence and the pace of viewing	The spectator has no control over the sequence or pace of viewing	The spectator can manipulate the sequence and the pace of viewing sometimes
Contemplation time	Viewer has ample contemplation time	Contemplation time restricted	Contemplation time can be at times ample and at times restricted
Perception of Movement in the VN	Movement results from active participation of the viewer	Movement is due to the rapid change of visuals	Movement can be caused by the active participation of the viewer as well as the rapid change of visuals
	Examples of SVNs: Cave paintings, Comics, Graphic Novels, Picture Books, Narrative Scrolls, Narrative on Objects, Miniature paintings, Murals, Info Graphics, etc.	Examples of DVNs: Animation, Drama, Bioscope Puppet Shows, Live Action Films.	Examples of IVNs: Interactive story books, Interactive Games, iPad – Alice in Wonderland

Conclusion

As human beings we have found a novel way of telling stories by illustrating those using visuals. We do this with a motive of communicating to an audience; explaining what, how, where, and in what manner the event took place. We employ the help of VNs to do this. The technique of illustrating stories has existed and continues to exist today. There is a large body of work that primarily deals with research on visual stories. These have been carried out and investigated in isolation by scholars under various headings such as comics, narrative art, animation, films etc. As we have proved through this paper that the fields mentioned above fundamentally have a common characteristic; in that they all narrate stories using visuals. We have thus established the need to acknowledge this feature and recognize the VN as a distinct category. It is therefore essential to segregate, distinguish and define 'Visual Narratives (VN)' as a sub category within the vast domain of Visual Studies. We propose VN be established as a distinguished field of study under the domain of Visual Studies.

Furthermore, VNs can be expressed using moving images or a fixed image and in recent times with an advancement of technology a combination of both the moving and fixed types. To these we assign the terms Static Visual Narratives (SVN), Dynamic Visual Narratives (DVN) and Interactive Visual Narratives (IVN) respectively based on the obvious difference with respect to the temporal aspect and viewer interaction. Comics, animation, history paintings are types of VNs. A visual that tells a story on a static medium (wood, metal, canvas, books, walls, objects etc) is a SVN. As the film or animation expounds the story employing rapidly changing images; the film is a DVN. Interactive storytelling sites, and interactive games with a narrative aspect are examples of the IVN. These sub types operate as further categories under the umbrella of VNs. Defining VN and its sub types and providing a systematic categorization of VNs

marks it as a specialized area of work. Doing so establishes the VN as a distinct entity and provides scope for structural analysis. This in turn helps students of VNs identify where their research area fits; and shows them similar areas of studies where they can interact and share their findings, furthering the interest of the domain. The system proposed in this paper aims at bringing together isolated areas of work that can help understand the varied aspects of VNs. In addition it opens up new areas of research for the student of VN.

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Investigation of the most preferred Bilingual Combination of Words: An Experiment with a selected Place Identification Signboard

Nanki Nath & Ravi Poovaiah

Abstract

Bilingualism, a combination of two languages provides two different forms of same meaning for a word. This phenomenon, though a global trend to display information on signboards, has varied forms in different places of India. In such diversity, preferences would vary to a high degree. This variation created interest to investigate the preferences and respective preference criterion of people for bilingual combinations of the word. The objective of the study was to find the most preferred bilingual combination of selected words. Standard typography legibility tests were conducted with five selected English typefaces (based on the British Typographic standard for classification - BS 2961:1967), each arranged separately on the selected size. Similarly, five Hindi typefaces were separately tested out for legibility rating .

The results were further combined together to create maximum number of bilingual combinations in a way that every English typeface combined with every Hindi typeface. This created diversity in combinations. The final stimulus was presented in form of nine bilingual combinations, put together on two selected exterior walls. The pattern of arrangement for the nine combinations was different in both the spaces. All the tests were conducted from 20, 40 and 60 feet viewing distances.

The data collected was then categorized as collection of observations, which were further classified into matrix of results under categories – Letters, Words, Combinations, Qualities and Grid. The results of the study highlight maximum preference for the bilingual combination of DV-

Yogesh and Helvetica Bold. . The two important findings were that legibility was affected not only by the design of the individual letterforms, but also by the way they are integrated to each other. The preference test for combinations record that from the maximum distance of 60 feet people concentrated on words more than letters. Another important finding indicated that majority of the people read english words first and then hindi words.

Introduction

Bilingualism (the term with its legitimate roots in linguistics) is a simple representation of two or more languages on a panel. Such bilinguals are mostly used for information signs outside buildings, traffic signs, warning signs, commercial signs. They are placed in places with a legally controlled bilingualism (in bilingual regions or national borders). Bilingualism aims to accommodate equally the discourse of existing populations in a space. This phenomenon, though a global trend to display information appears on signboards and many other information providing interfaces. It is a matter of dual existence of a language. Hence, the use of typography becomes even more critical as it is the visual form given to a language. India's official language being hindi was approved by Article 343 of our constitution that specifies Hindi in devanagri script as the official language of the Union. There have been research studies in form of issues related to devanagri script in print, invention of new devanagri typefaces for print and electronic use or some studies also explore classification of currently used devanagri typefaces, in order to understand the distinction between different typefaces from Indian point of view³.



However, there has been no probe so far as to gather issues regarding the typographic configuration of devanagiri typefaces used bilingually with english on Indian signboards. One could say that there are issues since people have a general view about not noticing signboards, or panels using texts with readability issue (specially in case of hindi letterforms). But, these hindi letters are combined with english and other local languages in order to overcome language comprehension by people of different cultures in a heterogeneous culture of India.

The curiosity to understand the bilingual dynamics between the two languages on a sign panel arose from the above mentioned arguments.

Method

The statement of inquiry for this experiment was to find the most preferred bilingual combination (of hindi and english together) for a selected information sign. The tests

were divided into 2 parts explained below.

Pilot study

Initial pilot study was conducted using an existing identification sign inside IIT-B. A questionnaire was developed to conduct the initial pilot test. The study was conducted between (9:00a.m. to 11:00 a.m. duration of the day). The respondent answers were audio recorded. The mini-study gave insights to remove the question(s) leading to non-response. The viewing distance of 60, 40 and 20 feet were pre-decided and finalized for later experiments. The text (STAFF CLUB) of the selected signage was used as a reference text to create sample designs for final tests.

Initial Questionnaire format:

Q.1. Rate the written text at : 60 40 20 (in feet)

- Perfectly Legible
- Legible
- 50-50
- Barely legible
- Illegible

Q.2. What do you see first, english or hindi text ?

Q.3. What languages can you easily read ?

Q.4. What problems do you find with signboards in general ?

Emerging points: Subjects found the variations of sign typography in this signage misleading. There were confusions regarding what was seen first (hindi or english text). The text constantly fluctuates (especially at 60 feet) due to presence of two bilingual hierarchies. Also, the reverse type has its specific legibility and visibility issues. The dark background dissolves the letters by edges that appear as visually constricting letterforms of the text. Taking into account all these points, the design elements to be included for the stimulus for the final tests were crafted.

Hence, further experiment design included following features:

- a) Use of black text on white background to achieve maximum contrast.
- b) Use of one size for English and Hindi text in the bilingual combinations (along with appropriate matching of english with hindi typeface).
- c) To have no restriction on the time given to a respondent to observe and rate the typefaces.

Experiment Structure

The experiment plan was divided into two scenarios:

A and B

The interface for sample presentation was a wall of an exterior structure in both scenarios A & B (details mentioned further). The subjects were asked to view the stimuli from fixed distances of 60, 40 and 20 feet for both tests. Experiments were conducted during pre-noon daylight condition. The dimensions for sample design were 42cm X 29 cm. in both scenarios.

SCENARIO A

Test 1. Standard Typography Legibility Tests: They were conducted separately for five english and five hindi typefaces.

Test 2. Preference test: Resulting best rated three English and three hindi typefaces were combined together to create maximum of nine bilingual combinations. Here, the nine combinations were placed in a 3 X 3 grid structure. Sample size: Total of 20 respondents participated in Test 1. The same no. also participated in test 2.

SCENARIO B

Preference Test (Randomization)

The situation in Scenario B takes the basis of the preference test idea of Scenario A. The same sample bilingual combinations were used in Scenario B. The significant distinctions here were the arrangement of the nine samples, which were arranged in a horizontal row on an exterior wall at a different place. The timings for the conducting the test were kept the same (as in Scenario A). Also, the preferences of 30 different respondents were audio-recorded in this case.

The horizontal arrangement for first 15 respondents was constant. But, the arrangement was flipped horizontally for the remaining 15 of 30 respondents. The idea behind a horizontal arrangement and variation within it was to see whether the changes would affect the choice of the most preferred bilingual combination and the related criterion or not? Would the resulting chosen combination be the

same as was in preference test of Scenario A ? Therefore, randomization in the arrangement of sample designs became crucial.

Participants

Scenario A

20 respondents who volunteered for the study included 9 males and 11 females, in the age-groups ranging from 20-58 years. The details like their names, age, occupation, height, vision factor, languages easily read were recorded.

Scenario B

30 respondents who participated in the test included 19 males and 11 females, in the age groups ranging from 12-78 years, with maximum people coming between the age groups of 30's to 40's. The details like their name, age, occupation, vision etc. were hand written by the researcher on separate hard-printed questionnaire developed for the study.

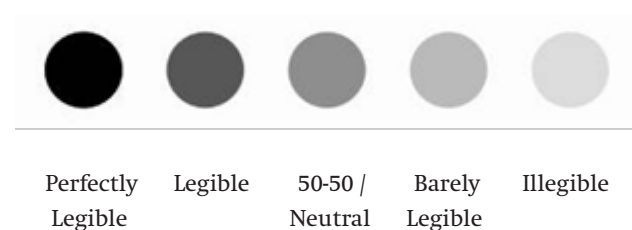
The design format for the same is given below:

Experiment Design

Scenario A

A total of nine bilingual combinations were explored (with each English typeface occurring with each Hindi typeface). The samples were presented to the subjects in one-by-one sequential order. For each stimulus, subjects were asked to rate it on a five-point standard legibility scale from distance 60, then 40 and lastly 20 feet (starting from the farthest distance to the shortest one).

Test 1 *The five-rate legibility scale used:*



Test 1 *Sample designs*

1.Stimulus for English text (Se):

i). The basis for selecting following five English typefaces was to use classic typefaces with majority of them that have been used in signage designs : Helvetica – Bold, DIN Bold, Frutiger 55 Roman, Whitney Medium and Franklin Gothic Medium. Also, the choice was based on the British Standards Classification of Typefaces (BS 2961:1967), which includes: Grotesque, Neo-grotesque, Geometric and Humanist classifications.

ii). Here, a Grotesque (Helvetica Bold) and a Neo-grotesque (Franklin Gothic Medium) was accompanied by the Humanist characters (Frutiger 55 Roman & Whitney Medium) along with DIN typeface (Deutsche Industrie-Norm=German Industrial Standard), a Geometric typeface.

2.Stimulus for Hindi text (Sh):

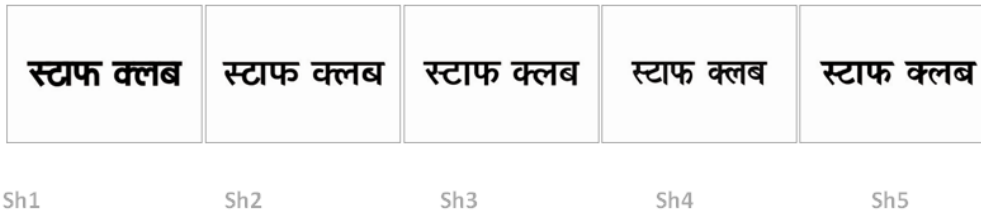
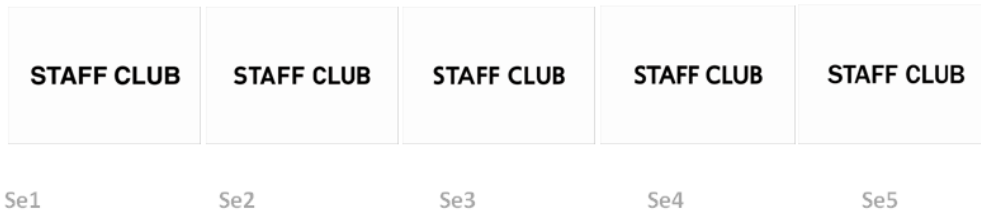
The basis for selecting following Hindi typefaces was to use a combination of uniform with non-uniform stroke width options : DV-Prakash Bold, DV-NIDMahendraBold, DV – Yogesh Bold, DV – Surekh Bold, DV – TT Natraj Bold. The criteria were a deliberate choice to understand what are the likable character preference(s) for indian sign panel, whether the uniform stroke hindi typeface or the non-uniform stroke hindi typeface

The basis for the selection of devanagari typeface doesn't follow a standard, since no standard for selection exists.

This issue needs to be resolved by the type designers in Indian context. Extensive research is going on in creating devnagari typefaces for print, electronic legibility. Added to these attempts, devanagri issues vis'-a-vis' Indian signs and their semantic requirements need a research based investigation.

3. Typographic considerations:

a. Simple optical scaling method to match the cap height of all typefaces (english and hindi separately) has been used in the sample designs. Keeping the the x-height by increments, arriving at almost 85% of the uppercase height for devanagari (Hindi) typeface, to create a visual balance in terms of word shapes that are distinctive but uniform.



The stimuli were presented separately following a sequence of Se1 to Se5 (for English) and Sh1 to Sh5 (for Hindi)



Example of Stimulus (Se4), Helvetica Bold matched with Prakash Bold

Optical scaling

100% Cap height (English text) - 85% of Cap height (Hindi text)

b. The visual harmony of letters is established between letterforms by adjusting the three following type elements adjacently: range in the cap height / kerning / word spacing (in %). In creating individual characters, the objective became emphasizing the distinctive quality of each letter whilst maximizing the adjacent white space – to facilitate clarity at distance and minimize the effects of tight kerning. The prime objective was always clarity, the aesthetic judgment criterion is secondary.

Test 1 RESULTS

Data was collected in excel sheets for both Se1 to Se5 (english text) and Sh1 to Sh2 (hindi text) to calculate the mean and standard deviations for each of the 10 fonts at the specified distances.

1. At 60 feet, there are maximum deviations for Frutiger 55 (Se3) and DIN Bold (Se2). The deviation value for Whitney medium (Se4) is the least, and hence is the most legible of all others.

At 40 feet, DIN Bold (Se2) and Frutiger 55 Roman (Se3) have almost same legibility rate. The best ratings have been obtained for Helvetica Bold (Se1).

At 20 feet, the legibility goes good from Helvetica Bold (Se1) to Frutiger 55 Roman (Se3) and Whitney Medium (Se4).

2. At 60 feet, there are maximum deviations in DV –Yogesh (Se3), DV –NIDMahendraBold (Se2) and DV-Prakash (Se3).

At 40 and 20 feet, the most legible values indicate towards DV – Yogesh Bold and DV – Prakash Bold.

3.Final combinations for test 2:

Se1, Se4 and Se3 (on the basis of least deviations at 20 and 40 feet)

Se1, Se3 and Se2 (on the basis of least deviations at 20 and 40 feet)

Inferences:

a.LEGIBILITY RELATION

Lesser the deviation from the mean value for a typeface, better its value rate of legibility.

b.VISION AND VISIBILITY

The values in 60 feet are fluctuating responses from subjects, analyzing it qualitatively one can speculate the reasons for the same. The 20 subjects for this test were a combination of normal, far-sighted and shortsighted vision of different age groups. Visibility from distance gets influenced by the vision quality of a person.

Test 2

Bilingual combinations of the best three English and Hindi typefaces, as results of test 1, were developed with each Hindi typeface conjoined with every English typeface. A maximum of 9 such bilingual combinations could be created, with Hindi text placed above the English text.

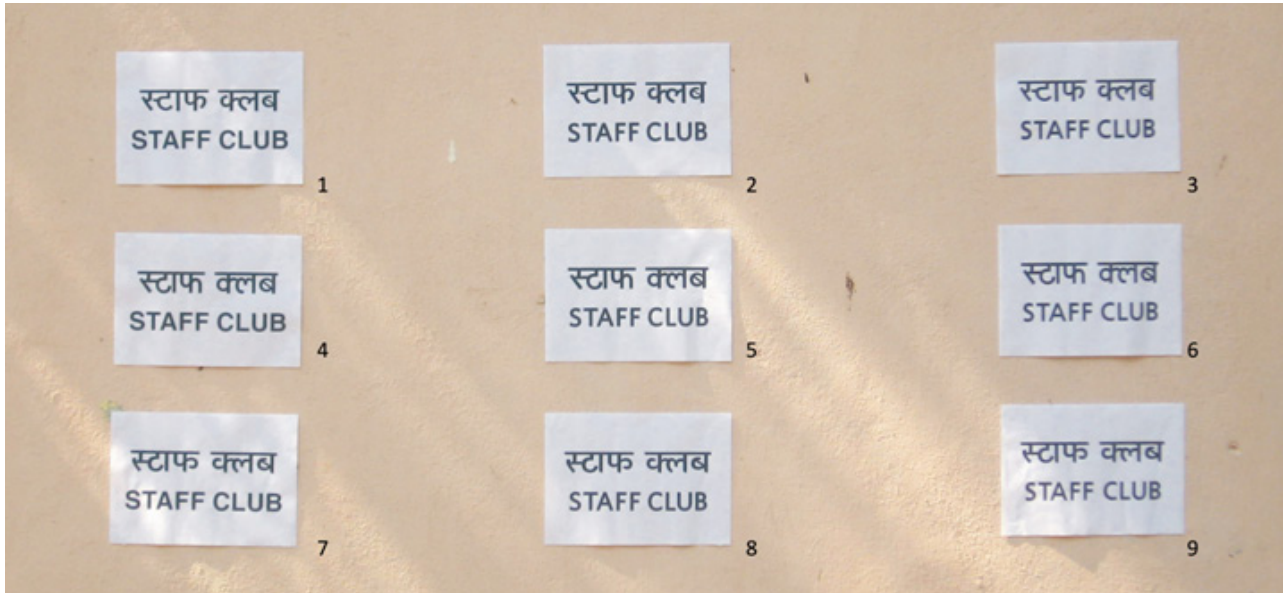


Diagram representing number of preferences for all nine bilingual combinations at 60, 40 and 20 feet:



The subjects were asked to choose the most preferred bilingual combination from the fixed distances, starting from 60 feet to 40 feet and finally from 20 feet. The second part of the questionnaire was to gather the reasons behind their choice of the bilingual chosen.

Test 2 RESULTS

Diagram representing number of preferences for all nine bilingual combinations at 60, 40 and 20 feet:

	60f	40f	20f
Sb1	16	14	17
Sb2	4	1	3
Sb3	3	0	2
Sb4	3	4	0
Sb5	0	0	0
Sb6	0	0	0
Sb7	0	2	2
Sb8	0	0	0
Sb9	0	0	0

The most preferred combination was Sb1 (DV – Yogesh Bold and Helvetica Bold)

At 60 feet

Clarity was observed by 18 people column-wise. Most of them liked first column and chose the first combination (Sb1) as the most preferred combination. At 60 feet, 14 people expressed that they could see “words” in English-Hindi together as a combination at first sight. The bold look of words STAFF CLUB in the first column for English Typeface (Helvetica Bold) was the criterion for combination preference for all 18 people. Also, a few of them liked the use of white space between English letters in Helvetica Bold.

The rest 2 subjects being communication designers keenly observed the counterspaces and the character design of the typeface options. Some critical observations made by one of them being :

1. Best typographic combination was Sb4 (DV- Prakash Bold with Helvetica Bold) from 60 and 40 feet, due to generous counter-spaces in Hindi – letters matching with negative spaces of Helvetica letters.

2. Second most preferable combinations were Sb5 and Sb6 (where, DV – Prakash has been combined with Whitney Sans and Franklin Gothic); due to better font matching between Hindi and English typeface.

3. DV – Yogesh has wide-spread negative spaces which do not match perfectly when seen from longer distances (60 and 40 feet). But, from 20 feet, the eye is able to adjust to the ratio of negative spaces in a better way. Yogesh letters with Helvetica letters provide convincing proportion as a combination both vertically and horizontally. The kerning is visible from 20 feet. The open letters of DV – Yogesh in comparison to DV – Prakash provides much better combination with kerned letters of Helvetica at 20 feet.

At 40 feet

1 Majority of the subjects found all combinations designed with same typefaces. Here, observations and choices emerged more by comparing typeface combinations in individual rows.

2. Contrast from letter to letter between English and Hindi typefaces amongst the nine combinations could be viewed comfortably from this distance by 15 subjects.

3 Here, these subjects concentrated on letters and expressed views accordingly [e.g.] (ta) of Se1 very clear, clear counters here, but in last row hindi letters have disturbing cuts especially letter [(ba)] - [Se7 ka “phh” kaafi alag hai, better than in Se4 and Se1].

4. Here, DV – NIDMahendraBold typeface in Sb7, 8 and 9 combinations was unanimously selected as the most “complicated but good-looking” typeface. Among the three, Sb7 emerged the most preferable combination because of clear and bold English letterforms.

At 20 feet

At the distance of 20 feet, 15 subjects found all the combinations bold and clear in comparison to the same combinations when viewed from 60 and 40 feet. Hindi

letterforms in comparison to English letterforms, were analyzed with enhanced interest shown by the subjects.

Other noteworthy responses:

1. The most favourable bilingual combination from this distance (20 feet) was Sb1 (DV – Yogesh Bold with Helvetica Bold). In general, clarity and bold look of English letters was considered best compatible with Hindi letters in the first two rows (including combinations Sb1 to Sb6). Both Sb1 and Sb7 were likeable combinations because of the bold character of English typeface (Helvetica Bold). Sb1 combination was considered simple and most clear of all (due to simple Hindi letters complimenting the letters of English). On the contrary, Sb7 was the second most

likeable combination (because it provided “stylish curvaceous” Hindi letters, DV – NIDMahendraBold created a unique combination with English letters of Helvetica Bold).

2. Hindi typeface in second row was considered simple (especially in cases of Sb4 and Sb6). The Hindi typeface “Prakash – Bold” has uniform stroke width, which makes it least complicated in terms of shape. An interesting response by one of the subjects was that Prakash Bold has letters which could be generally seen in children’s books, with letters having simple, straight forms with almost no extra curves. (the observation was particularly targeted to letters like “ta” and “phh”.

B1 (Arrangement 1)

Combinations	S.no.	60f	40f	20f
DV- NID Mahendra Bold Franklin Gothic Medium	Sb1	3	1	1
DV – Prakash Bold Whitney Sans Medium	Sb2	0	0	0
DV – Yogesh Helvetica Bold	Sb3	9	12	14
DV – Prakash Bold Franklin Gothic Medium	Sb4	3	0	0
DV – NID Mahendra Bold Helvetica Bold	Sb5	0	0	0
DV – NID Mahendra Bold Whitney Sans Medium	Sb6	0	0	0
DV – Prakash Bold Helvetica Bold	Sb7	3	2	1
DV – Yogesh Whitney Sans Medium	Sb8	0	2	1
DV – Yogesh Franklin Gothic Medium	Sb9	0	1	1

B2 (Arrangement 2)

Combinations	S.no.	60f	40f	20f
DV – Yogesh Franklin GothicMedium	Sb1	0	0	0
DV – Yogesh Whitney Sans Medium	Sb2	2	4	2
DV – Prakash Bold Helvetica Bold	Sb3	6	3	6
DV – NID Mahendra Bold Whitney Sans Medium	Sb4	3	1	0
DV – NID Mahendra Bold Helvetica Bold	Sb5	3	1	2
DV – Prakash Bold Franklin Gothic Medium	Sb6	0	1	2
DV – Yogesh Helvetica Bold	Sb7	8	10	13
DV – Prakash Bold Whitney Sans Medium	Sb8	1	3	0
DV- NID Mahendra Bold Franklin Gothic Medium	Sb9	1	1	1

RESULTS

Results below consider preference opinions of 18 subjects. Two subjects out of total twenty had no. of variations in opinions. One of the subjects had one-sided visual impairment (his left eye had correct vision at long distance and the right eye had correct vision at short distance). The observations made by this subject has been specifically described below.

60 feet

B1

1. For all 18 subjects, clarity in word “Staff” became the major preference criterion from the distance of 60 feet.
2. 12 subjects expressed the view of considering English words first and then concentrating on Hindi words. Here again, the combination of Sb3 (DV – Yogesh Bold with Helvetica Bold) was the most preferred combination of all. (see table).
3. In three responses from 60 feet, Sb1 was considered equivalent to Sb4 as best English – Hindi combinations. This is interesting, since the Hindi typeface used in both are very different. The reason though given by the respondents was better clarity of English letters than Hindi letters in both combinations.

B2

1. The maximum no. of preferable responses for Sb7 have six responses, where Sb3 was considered equally preferable combination as Sb7. The major criterion being clear English words and different kind of hindi typeface (different than the much bolder hand-painted letters seen generally on signboards in India).
2. Sb4 and Sb5 could be considered second best preferred combinations at 60 feet. In this case, both were rated equally preferable by three respondents. The criteria being,

40 feet

B1

1. Here, Hindi letters were considered first by the respondents. Then the shapes of English letters were viewed in comparison to Hindi letters. The major criteria for selection of combination Sb3 here was shapes of letters (phh, ta, la); shapes of letters (S, F and C) in comparison to English letterforms in other combinations.

E.g. of one of the opinions “Letters S, F and C of Helvetica bold in combination 3 are better looking, provide better contrast with Hindi letters; in comparison to S, F and C English letters used in combination 8” . In combination 8, Whitney Sans was combined with the same Hindi typeface DV – Yogesh used in combination Sb1 with Helvetica Bold. Since, from 40 feet, letter shapes became clearer, it was easier for the subject to observe the use of same Hindi typeface in the two combinations, with actual difference of forms in the English letters.

2. Similarly, Sb3 was compared with others in three more such responses. (in one, compared to Sb8 again and in the rest two, compared to Sb7 – DV – Prakash Bold with Helvetica Bold).

B2

1. Letter shapes and contrast between Hindi and English letters were observed for the first time from 40 feet.
2. Among 10 favoured answers for Sb7, 3 responses considered Sb7 and Sb3 equally preferable bilingual combinations for a signboard. The preference criterion being bold and clear English letters, big letter shapes in DV – Yogesh for Sb7 and simple, better shapes of Hindi letters in Sb3.

20 feet

B1

Sb7 (DV – Yogesh with Helvetica Bold), was chosen unanimously as the most favoured combination of all

The criteria from 20 feet being best proportion of English to Hindi letters, best contrast between English to Hindi letters and the bold appearance of English letters.

B2

1. Sb7 again has maximum no. of preferences as a combination. But, here Sb7 was considered equivalent in terms of English to Hindi letter compatibility with Sb3 in 4 responses. The reason being likeability of English letters (Helvetica Bold) used in both combinations. All the four respondents observed the use of same English typeface for both the combinations.
2. Two respondents with corrective vision compared Hindi letters “ta” and “ba” in both Sb7 and Sb3 to reach a conclusion as to which combination is the most preferable one for a name identification signboard.
3. Not only individual letter shapes, but also the space between letters were taken into consideration while selecting the final combination by all 18 respondents.

CONCLUSION

Most preferred Bilingual Combination

1. The most preferred combination was DV – Yogesh Bold (Hindi) with Helvetica Bold (English). The preference criterion for the selection, though varied in both Scenarios, but in a nutshell, Helvetica Bold was considered with “Bold”, “Big” and “clear” words and letters.
2. In Scenario B, idea of randomization in the arrangement of combinations was applied. One could see that when the arrangement was changed (as could be seen in the results of B2), the overall preference was the same combination (as in Scenario A), but the preference is shared with other combination using the same English typeface.
3. From above points, one could conclude that in a bilingual combination of English with Hindi typeface (under a controlled design element of using black text

against white background), the kind of English typeface used becomes one of the most important selection criterion, followed by compatibility of Hindi typeface to English typeface.

Words, then letters

Integrated letters (or words) become important on a sign panel when viewed from a long distance. At shorter distances, “letters” and their details become more important, probably because the details of positive negative spaces, details in the integrated letters could be seen in clearly from short distances.

1. Also, at the distance of 60 feet, “words” in English were compared to other English typefaces. The distinction between typefaces could not be observed by the respondents at first sight of all nine combinations. They took more time to convey their preferences.
2. At distances of 40 and 20 feet, the viewer’s started commenting on “letter shapes”. Observations, comparisons between English and Hindi typefaces centered around the qualities of letters.
3. Also, at the distance of 60 feet, “words” in English were compared to other English typefaces. The distinction between typefaces could not be observed by the respondents at first sight of all nine combinations. They took more time to convey their preferences.
4. At distances of 40 and 20 feet, the viewer’s started commenting on “letter shapes”. Observations, comparisons between English and Hindi typefaces centered around the qualities of letters.

About devanagri letters

Responses in relation to Hindi typefaces have considered “individual letterforms” rather than “integration of letters” as words. (viewed from the distance of 40 and 20 feet sequentially). For 60 feet, there has been negligible argument about letterforms or the visual look of hindi

Though, there have been responses of likability of hindi letters (in typeface like DV-NIDMahendra bold of having “stylish”, “unique”, “unusual letterforms”), the final preference criterion were again clear, uniform letter shapes (with least or no variation), letters with generous white spaces around them, letters with least complicated curves. All these could be best viewed in the devanagri typeface “DV – Yogesh Bold”.

Hence, emerging findings in relation to this case study indicate following future scope of research intervention in the area of bilingual typography:

1. Review the visual issues related to character design of devanagri letterforms used on signboards in India.
2. An inquiry into the hindi letterforms would combine the analysis and understanding of English typography and standards currently used. Whether there arises a need to create a new display typeface or create essential standards (which are currently not existing for signboards), could not be investigated in isolation. The bilingual function of the Hindi along with English words on Indian signboards becomes an objective research inquiry.

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Identification & Classification of Semantic Units Used in Formation of Patterns in Kundan Jewellery, a Methodical Approach.

Parag K. Vyas, V.P. Bapat

Abstract

India has a rich tradition of jewellery and there are a number of styles of jewellery making in practice, each with its uniqueness, special forms and style. Kundan is a type of traditional Indian jewellery that uses a framework of gold crafted in intricate details it utilizes chips of diamond, raw or minimally polished for the purpose of setting. Backside of kundan jewellery is embellished with hard enamel, typically red green and red blue colours that make back side of jewellery equally pleasurable to look at; an unusual but important feature that makes the jewellery wearable from both sides.

Kundan work has fine geometry and achieves amazing level of symmetry using rough shapes of gemstones that may or may not be a symmetrical or homogeneous assortment. It requires excellent craftsmanship and intelligent arrangement of stones in their place to achieve an aesthetically pleasing composition.

In recent times, kundan has made a comeback as a prominent style. Articles are very expensive both in fiscal and work demanding terms. The process of making jewellery starts by taking a strip of gold and bending it in a variety of shapes in multitude, those are subsequently assembled on a base plate. Kundan, Jewellery is handcrafted piece by piece to assume form clusters that in turn form a complete piece.

This study is focussed at identification of smallest semantic units that are used in kundan jewellery. For purpose of identification literature, artworks, works in progress were studied in depth. Jewellery showrooms, Shop floor surveys were conducted along with in depth

interviews with experts in field. Findings were presented to group of experts and academics, their suggestions were incorporated in documentation.

A total of ninety one smallest semantic units that are used in design of kundan jewellery, were identified during path of research. These were classified into five categories based on geometry. These semantic units alone or in combination with other units in meticulous manner create kundan jewellery.

Introduction

India has a rich tradition of jewellery and there are number of styles of jewellery making in practice, each with its uniqueness, special forms and style. Kundan jewellery is a particular type (of jewellery) that utilizes chips of diamond, raw or minimally polished for the purpose of setting, thereby giving an article its classical look (Figure1). This type of jewellery is motivated by the old Indian concept of retaining maximum weight of diamonds and gemstones, used as they were naturally found or minimally faceted. This typical use of diamonds and gemstones is in contrast to western concept of polishing them for maximum brilliance or fire, in formal brilliant cuts (Pagel-Thiessen1993:174) (Snowman 1990:182-185). Properties of carat weight and quality of cut (that determines the fire inside the diamond) are diametrically opposite to each other. If a polisher tries to retain weight it compromises optical properties and vice versa.



Figure1- Kundan as a style of setting

Kundan jewellery has a structural framework of gold crafted in intricate details. The gemstone is set from the front using a foil of very high purity gold foil. For the purpose of setting a very thin foil is rolled in a mill, at such fineness and low thickness gold becomes very pliable. Parts and pieces of this foil are pressed in cavities left around the gemstone, partly set with setting paste. By pressing layer after layer of gold, space around gemstone is slowly filled with solid gold, this pressing is done by a pointed tool that gives good pressure and negotiates tight corners to get a flush stone close setting (Untracht 1985:614). Sometimes mild heat is applied to fuse gold together. Gold surface holding gemstone in place is evened out using an engraver that leaves behind a lustrous surface. This method is also used to make gold patterns over a variety of substrates like conch shell, ivory, precious and semi precious gemstones like agate and marble. To achieve a pattern as if gold is inlaid on surface, first pattern is traced on surface. Thereafter holes are drilled in key locations that act as nodes and anchor points. These points are filled with gold pins (or foils or both) that work as base

and anchor for successive gold work. Gold in form of foils is worked on it and layers deposited to get desired shape. Excess gold is trimmed using engravers. Ultimately the surface appears as gold is inlaid into it (Sharma, Varadrajana 2008:111).

Kundan work has a well-defined geometry and amazing level of symmetry are achieved using rough shapes that may not be uniform and symmetrical like round brilliant cuts. Work requires excellent craftsmanship and clever arrangement of stones in their place to achieve an aesthetically pleasing composition. “Janchna” (Hindi, Gujarati- to make look beautiful) is a process of looking at composition before actual setting takes place. A Photostat or tracing of design is taken and stone composition is checked over this acting as background. There may be several trial and errors before a stone finds its right place and orientation. Once the craftsman is satisfied with his scheme of things, actual setting takes place.

Backside of kundan jewellery is embellished with hard enamel typically red green and red blue colours. This makes back side of jewellery equally pleasurable to look at a feature that makes jewellery wearable from both sides, the backside may often be better than front(Sharma, Varadrajana 2008:21) Enamel also works as security feature for settings which gets disturbed if a stone is taken out and set again with a lower carat or inferior quality stone.

Need for research

Kundan jewellery has made a comeback in recent years and re-established as a classical style. The work is intensive both in terms of efforts and material. There is a vacuum of methodical study in domain of kundan. Some material was available in the form of photographic documentation or in books on jewellery (Balakrishnan 2006:103-141). Other source for kundan was jewellers in possession of material either in form of designs or articles (ready and semi finished) they were initially reserved in sharing the

same. This style of jewellery has a visual language of its own but no cataloguing is available, to understand and describe, in a systematic manner.

Methodology

Research in domain of jewellery needed an approach demanding delicacy and subtlety. Information and resources are not easily available and rather protected for the fear of competition by other jewellers. This research was conducted by adopting proven research methodology, as suggested by researchers (Hair et al. 2005, Kothari 2002) from time to time for different cases. In present study, Jewellers and kundansaz were approached for preliminary learning. Each and every approachable person was interviewed at length. These interviews were intended for following purpose

- a) To understand the importance of kundan Jewellery in India
- b) Understand their essential visual features, their usage in Kundan and application in design

It took time, efforts and confidence building measures to win their trust to have access to these resources. These interviews helped in better understanding of subject from professional's point of view.

For purpose of study, material from various sources was collected and studied (Shajahan2004:137). Primary sources were photographs in books, photographs of articles, sketches and renderings by those practicing kundan. Study material from various sources were compiled and studied in a methodical way by labelling individual semantic units and tabulate them. This whole exercise led to identification of a total of 99 basic semantic units along with their basic descriptions. These findings were validated by series of experts (four Jewellers, five kundansaz and four designers) practicing kundan Jewellery. Finally 99 unites were retained, while those found to be replicating in terms of shape or not carrying unique design measures,

were deleted. A chart of these semantic units was prepared as a foundation for further classification.

Smallest Semantic Units

Jewellery has an overall form for any given article like ring, pendent, bracelet, neck piece or ear pieces. This overall form is a collection of sub assemblies as form clusters (Figure2). A Form clusters in turn is made of units that are geometric or inspired by nature. These are “smallest semantic units” elemental building blocks of jewellery, they are used alone or in combination with other such units an aesthetically pleasing composition to make a “form cluster”.



Figure2. Kundan Necklace, smallest semantic units & form

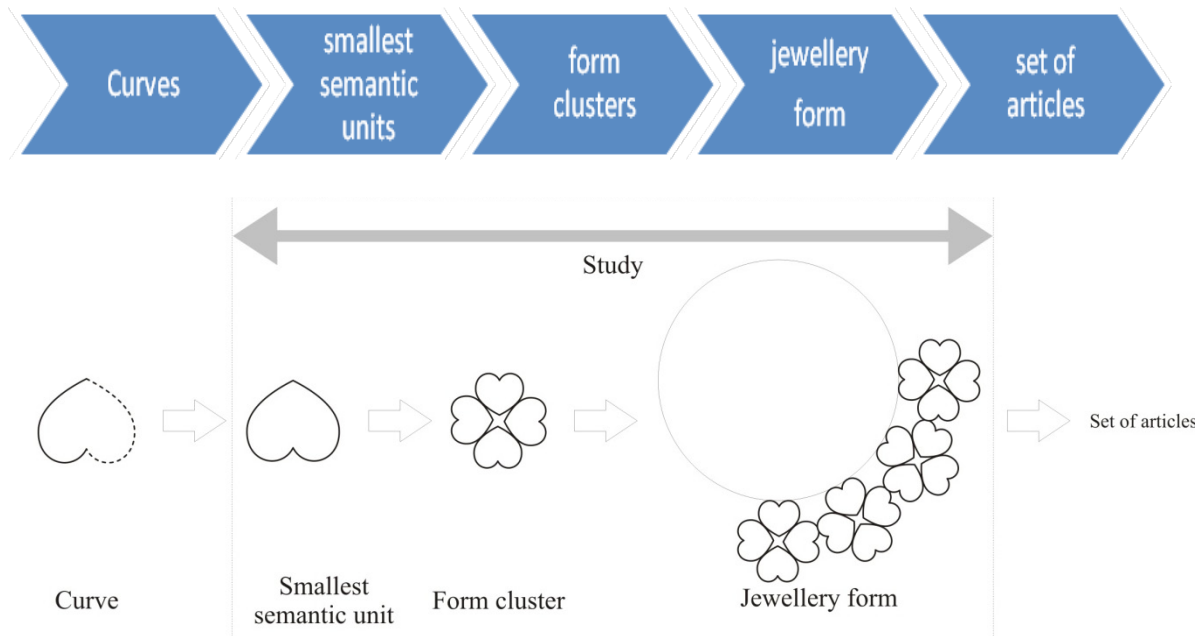


Figure3- Progression from basic curves that make smallest semantic units to a set of jewellery

A progression from basic curves that make smallest semantic units to a set of jewellery comprising of various articles could be seen as





















- Curves
- Smallest semantic units
- Form clusters
- Jewellery (overall form)
- Set of articles (following a theme)





















Illustration (Figure3) is to articulate length and breadth of research, which is from smallest semantic units to overall jewellery form. Accordingly, Semantic units identifiable by names are basic units of construction of jewellery, if further divided into curves, meaning is lost. Semantic units have their own symbolism and draw inspiration from nature, both plant and animal (Sharma,





















Varadrajana 2008:10). In this study 99 smallest semantic units are identified that were individually identifiable by their names like Koile, daudi paan and jau etc. These smallest semantic units, by way of analogy of letters (and ligatures) of alphabet, were used in combination with other semantic units to constitute form clusters (words), these in turn are used to form the article (sentences) and sets (paragraphs as, several coherent lines on a theme). (Jewellery articles, a neck piece, two bangles, a mangteeka and a pair ear rings constitute a basic set.





















Analysis (Tabulation)

The semantic units were recognized by their names; it was derived by their particular geometric shapes and used in communication among kundansaz community. The rational was based on resemblance to a known geometric

Smallest - Semantic Units & Names				01
01	02	03	04	
				
Choki	Tikhi Choki / Shakar pan	Austpel / Austpehal	Gole Choky	
05	06	07	08	
				
Lamba Austpel	Tikha Austpel	Gole	Nim gole	
09	10	11	12	
				
Tikha Chofaliya	Gole Chofaliya	Gole chhukiya	Dandi	
13	14	15	16	
				
Toda dandi pan	Tikha Dandi Pan	Keri Dandi	Keri	
17	18	19	20	
				
Keri Dandi	Kery Chofal	Sira / Bund	Gole Trikon	

Smallest - Semantic Units & Names				02
21	22	23	24	
				
Tikha Pyala	Dandi Pyala	PyalaPami	Pyalapati	
25	26	27	28	
				
Pyalapati2	Pyala pati3	FulPyala	Shankhala	
29	30	31	32	
				
Shankh Ful	Chhipla	Chhipla1	Chhipla 2	
33	34	35	36	
				
Chand	Toda Chand	Chidi1	Chidi2	
37	38	39	40	
				
Chidi3	Shira pan	Pankh	Jo	

Smallest - Semantic Units & Names				03
41	42	43	44	
				
Koyali	Koyali1	Lamb Koyali	Koyali dandi	
45	46	47	48	
				
Dand Koyali	Koyali Mindi	Gole Koyali	Dandi Koyali	
49	50	51	52	
				
Koyali Khach gole	Khanch Koyali1	Khach koyali2	Khach koyali3	
53	54	55	56	
				
gole koyali dandi	TiKoyali mindi	Tikoyali	Koyali Pankh	
57	58	59	60	
				
Koyali pankh1	Koyali Patti pyala	Koyali ful	Mirchi	

Smallest - Semantic Units & Names				04
61	62	63	64	
				
Kalli	kalipatti	Dandi Kalli	patti dandi	
65	66	67	68	
				
fulpatti	Fulpatti1	Ful Dandi	Mindi Jo	
69	70	71	72	
				
bel patti	Pandadi	Jasad patti	Golepatti	
73	74	75	76	
				
Patti	Nim patti	Kamal	Adha Ful	
77	78	79	80	
				
Khach Nakhya	Nakhya	parag raj	bati	




















Smallest - Semantic Units & Names				05
81	82	83	84	
				
Batak	More	Chidi patti	Patti1	
85	86	87	88	
				
Pnach patti ful	Tikha che fuliya	Pattiya	Ful	
89	90	91	92	
				
Kamal patti	Ful pyala	Machhli	Cut Patti	
93	94	95	96	
				
Gole Pyala	Mindi Dandi	Putang	Tikha Pan	
97	98	99		
				
Mindi S	Ful Kalli	Gole Trikon 1		

Figure4- Smallest Semantic Units identified by their names

shape like polygon, closed curve or forms from nature like birds, flowers and leaves.

This identification of a smallest semantic unit with a name makes description and articulation of a design more effective, illustrated as follows (Figure4).

Classification of Smallest Semantic Units

A cataloguing provides a platform for further study that acts as reference. This tabulation is a register from which semantic units are further classified into five categories

for ease of understanding.

In diamond polishing industry, a manner of naming based on appearance and resemblance to a known form (Figure5a&b) was followed in classification of fancy brilliant cut diamonds (Pagel-Thiessen1993:171-173). Drawing reference, this classification was based on basic geometric shape or resemblance. These categories provide a methodical way to look at them as a group following similar geometric ideology (ibid 255-258).

This method of classification was found suitable and adapted for classifying Semantic units used in kundan relatively large category hence, further divided in four sub categories.

Further fancy cuts of diamonds

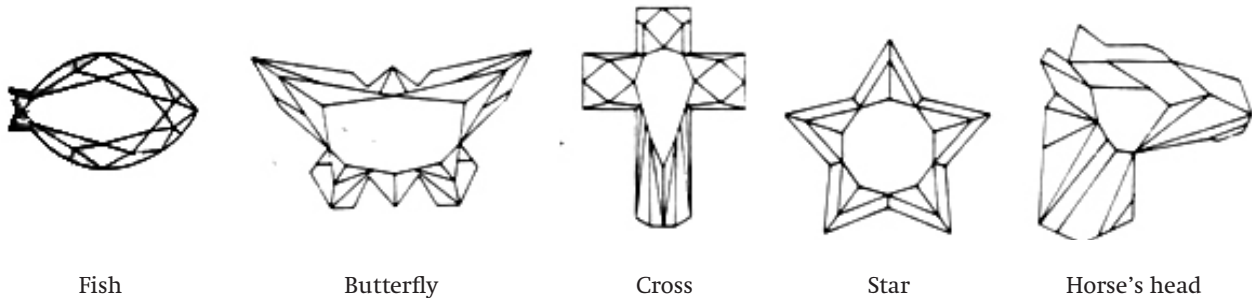


Figure5a- Naming based on appearance and resemblance

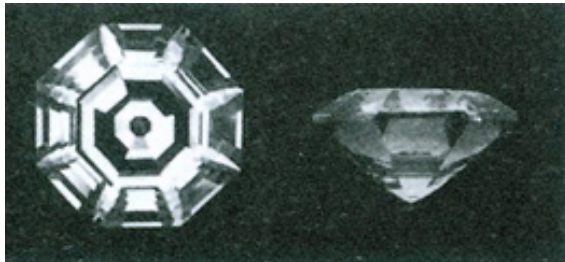
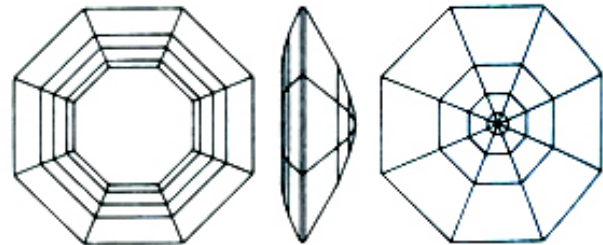


Figure 5b- Naming based on appearance and resemblance



jewellery. Identified 99 semantic units were classified into five broad categories. Category of sphenoid was a relatively large category hence, further divided in four sub categories.

1. Two axis of symmetry- These smallest semantic units had two axis of symmetry that is they were symmetric around two axes, vertical as well as horizontal. Conics (Circle & ellipses) and various uniform polygons fall in this category. Forms that were made by replacing sides of an even sided polygon by a modified curve also come under this category.


















2. One axis of symmetry- These smallest semantic units had one axis of symmetry, either vertical or horizontal. Shapes like Heart, club, spade, cup, half moon and polygons with unequal opposing sides fell in this category.










3. Rotational symmetry- these smallest semantic units were made up of floral motifs that were having rotational symmetry (inversion around a point is visible). Indian swastika is a classical example of such an inversion, in this study there was one such member kery chowfuliya.



















4. Sphenoid- These smallest semantic units were made up of splines that follow shape of an alphabet (s,c & n) or a wing. Koilee, pankh, Phool and Phool kali constitute this category. This is a large group that was further divided into four sub categories as the name of alphabet suggests S-shape, N-shape, C-shape and Fan shape. This sub classification was driven by the semblance of the shape of alphabet and visual flow of smallest semantic unit.

5. Conjoined- these semantic units were an assemblage of more than one individual unit, which acquire a meaning of their own and are treated as a smallest semantic unit. They had a full thought encompassed within themselves, reflecting in their name. Kamal, chidi and machhli are such semantic units. These semantic units by analogy, for purpose of understanding could be compared to Sanyuktakshar or beej mantra (seed syllable) that is a syllable and a mantra within itself.



















Sr. No.	Name	Semantic Units	Description	Classification
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1	Choki		A square, used in both vertical and slant configuration	Two axis of symmetry
2	Tikhi Choki / Shakkar para		A square with concave curve forming sharp points	Two axis of symmetry
3	Austpel / Austpehal		An octagon with equal sides & chamfer	Two axis of symmetry
4	Gole Choky		A square with liberal fillets	Two axis of symmetry
5	Lamba Austpel		An octagon with adjoining unequal but equal opposing sides & chamfer	Two axis of symmetry
6	Tikha Austpel		A trapezoidal octagon with two equal opposing sides other two long and short	One axis of symmetry
7	Gole		A circle	Two axis of symmetry
8	Oval / Nim gole		An ellipse or a pillow shape with major axis used vertically	Two axis of symmetry
9	Tikha Chofuliya		A floral motif with four petals made of two concave curvatures meeting at a point	Two axis of symmetry
10	Gole Chofuliya		A floral motif with four petals	Two axis of symmetry
11	Gole chhakliya		A floral motif with five or more petals or cluster of petals	One axis of symmetry
12	Heart/ Daudi		A heart shape resembling a beetle leaf	One axis of symmetry
13	Teda daudi pan		A heart shape with point tilted to one side	Sphenoid - C Shape
14	Tikha Daudi Pan		A beetle leaf shape, skewed and compressed, also called teekha paan	Sphenoid - S Shape
15	Keri Daudi		A shape with two pointed ends and a bulge in between	Sphenoid - C Shape
16	Keri		A mango shape, a often used form in all major styles	Sphenoid - C Shape
17	Keri Dandi		A mango shape, a often used form in all major styles, one point slightly elongated to resemble stem of fruit	Sphenoid - S Shape

18	Kery Choful		A floral motif with four petals made of two concave curvatures meeting at a point and tilted in a direction	Rotational symmetry
19	Siru / bund		A Drop or Pear Shape shaped like a pendeloque	One axis of symmetry
20	Gole Trikon		A triangle or trilobite made by replacing sides of a triangle by an arc of a circle	One axis of symmetry
21	Tikha Pyala		A cup shape resembling a goblet or chalice top, one point made of two concave curves	One axis of symmetry
22	Daudi Pyala		A cup shape roughly resembling a goblet or chalice top, slight skew to one side	Sphenoid - C Shape
23	PyalaPatti		A shape resembling a combination of a chalice and a leaf	Sphenoid - C Shape
24	Pyalapatti1		A shape resembling a combination of a chalice and a leaf, slender and skewed to a side	Sphenoid - N Shape
25	Pyalapatti2		A shape resembling a combination of a chalice and a leaf, stylized	Sphenoid - S Shape
26	Pyala patti3		A shape resembling a combination of a chalice and a leaf, elongated and skewed to a side	Sphenoid - S Shape
27	Ful Pyala		A cup shape resembling a goblet or chalice top, one point made of two concave curves, asymmetric and skewed	Sphenoid - C Shape
28	Shankhala		A conch shape bulbous on top and pointed to bottom	One axis of symmetry
29	Shankh Ful		A conch like spiral shape growing outwards	Sphenoid - C Shape
30	Chhipla		A shape resembling a lobe of pearl oyster	Sphenoid - S Shape
31	Chhipla1		A shape resembling a skewed lobe of pearl oyster	Sphenoid - S Shape
32	Chhipla2		A shape resembling a lobe of pearl oyster with a depression on one side	Sphenoid - N Shape
33	Chand		A Half moon shape like a sickle blade	One axis of symmetry
34	Teda Chand		A skewed half moon shape	Sphenoid - C Shape
35	Chidi1		An abstract bird in flight shape	Sphenoid - S Shape
36	Chidi2		An abstract bird in flight shape, elongated	Sphenoid - S Shape

37	Chidi3		An abstract bird in flight shape, steep skew vertically	Sphenoid - S Shape
38	Shiru pan		A leaf shape sans vein, made of skewed drop	Sphenoid - C Shape
39	Pankh		A wing shape with detail cuts depicting individual feathers	Sphenoid - Fan Shape
40	Jau		A shape resembling wheat or barley seed made of two arcs of a circle	Two axis of symmetry
41	Koyali		A shape resembling leaf made of two sinewy curves	Sphenoid - S Shape
42	Koyali1		A shape resembling leaf made of two sinewy curves, with a slight bulge on one side	Sphenoid - N Shape
43	Lamb Koyali		A shape resembling leaf made of two sinewy curves, with a lean appearance	Sphenoid - N Shape
44	Koyali dandi		A stylized koyali with a taper towards top, heavy bottom	Sphenoid - N Shape
45	Dand Koyali		A stylized koyali with a taper towards top, heavy bottom, one point slightly elongated to resemble stem	Sphenoid - N Shape
46	Koyali Mindi		A stylized koyali with point slightly elongated to resemble stem terminating in one circle called mindi	Sphenoid - N Shape
47	Gole Koyali		A stylized koyali with a prominent bulge to accommodate large stones	Sphenoid - N Shape
48	Daudi Koyali		A stylized koyali with partial features of daudi paan	Sphenoid - N Shape
49	Koyali Khach gole		A stylized koyali with a prominent bulge to accommodate large stones and a notch to one side	Sphenoid - N Shape
50	Khanch Koyali1		A stylized koyali with a notch to one side	Sphenoid - N Shape
51	Khach koyali2		A stylized koyali with slender appearance and a notch to one side	Sphenoid - S Shape
52	Khach koyali3		A stylized koyali with partial features of daudi paan with a prominent s shape	Sphenoid - S Shape
53	gole koyali dandi		A stylized koyali with a mindi fused in body	Sphenoid - S Shape
54	Ti-Koyali mindi		A stylized koyali with three prominent apex showing in one with a mindi fused in body shape	Sphenoid - C Shape

55	Ti-koyali		A stylized koyali with three prominent apex showing in one shape	Sphenoid - C Shape
56	Koyali Pankh		A stylized koyali with three prominent apex showing in one with a mindi fused in end, fan like appearance	Sphenoid - S Shape
57	Koyali pankh2		A stylized koyali with two prominent apex showing in one shape with fan like appearance	Sphenoid - Fan Shape
58	Koyali Patti pyala		A chalice shape with three prominent apex, sharing partial features of a koyali and and a patti	Sphenoid - C Shape
59	Koyali ful		A flower shape composed from a combination of koyalies	Conjoined
60	Mirchi		A shape resembling a chilli pod stylized like a	Sphenoid - C Shape
61	Kalli		A shape resembling a flower bud just opening	Sphenoid - S Shape
62	kaliipatti		A shape resembling a flower bud with partial features of a leaf	Sphenoid - S Shape
63	Dandi Kalli		A shape resembling a flower bud with end stylized and elongated to resemble stem	Sphenoid - C Shape
64	patti dandi		A leaf shape with end stylized and elongated to resemble stem	Sphenoid - S Shape
65	fulpatti		A shape resembling a flower petal with partial features of a leaf	Sphenoid - S Shape
66	Fulpatti1		A shape resembling a skewed flower petal with partial features of a leaf	Sphenoid - S Shape
67	Ful Dandi		A floral motif with two petals and one stylized point elongated to resemble a bud	Sphenoid - S Shape
68	Mindi Jo		A shape resembling wheat or barley seed with partial features of koyli and mindi	Sphenoid - N Shape
69	bel patti		A leaf shape with a long and stylized stem	Sphenoid - N Shape
70	Pandadi		A leaf shape with a prominent bulge to accommodate large stones	Sphenoid - N Shape
71	Jasud patti		A shape like petal of a hibiscus flower	Sphenoid - C Shape
72	golepatti		A leaf shape with an apex and two lobes	Sphenoid - N Shape
73	Patti		A shape resembling a broad leaf with a vein	One axis of symmetry

74	Nim patti		A shape resembling a neem leaf with a vein and cuts	Sphenoid - C Shape
75	Kamal		A stylized lotus shape with five apex	One axis of symmetry
76	Adha Ful		Flower with three petals and one mindi	One axis of symmetry
77	Khach Nakhiya		A shape like an animal nail with a depression to one side	Sphenoid - C Shape
78	Nakhiya		A shape like an animal nail with a depression to one side stylized like tiger claw	Sphenoid - C Shape
79	Parag raj		A shape like stamen of a flower	Sphenoid - C Shape
80	Bati		A shape resembling a flame of a clay lamp	Sphenoid - C Shape
81	Batak		A bird shape resembling a duck or swan	Sphenoid - C Shape
82	More		A stylized peacock motif made of paan, koeli mindi and kali	Conjoined
83	Chidi patti		A shape like a club in cards, with one lobe having an apex	Conjoined
84	Patti		A highly stylized leaf, opening like fern shoots	Conjoined
85	Panch patti ful		A symmetrical flower with five pointed petals top petal centrally placed with or without a hollow centre	Conjoined
86	Tikha che fulliya		A symmetrical flower with six pointed petals top petal centrally placed with or without a hollow centre	Conjoined
87	Pattiya		Cluster of leaves usually three or more	Conjoined
88	Ful		A highly stylized flower blossoming	Conjoined
89	Kamal patti		A lotus motif with or without stem and leaves	Conjoined
90	Ful pyala		A floral motif with two petals and lamba pyala	Conjoined
91	Machhli		A highly stylized fish motif	Sphenoid - N Shape









92	Cut Patti		A leaf cut from the sides	Sphenoid - C Shape
93	Gole Pyala		A cup shape resembling a goblet or chalice with a round top	Sphenoid - C Shape
94	Mindi Dandi		A shape resembling a comma made of a mindi and a dandi	Sphenoid - C Shape
95	Patang		A kite shape made of two convex and two concave arches	One axis of symmetry
96	Tikha Pan		A beetle leaf shape, skewed and compressed, with three apex	Sphenoid - N Shape
97	Mindi style		A stylized s mirrored and terminating into two mindi shaped	Sphenoid - N Shape
98	Ful Kalli		A flower and a bud shape stylized termination	Conjoined
99	Gole Trikone1		A triangle or trilobite with rounded corners	One axis of symmetry

Table1- smallest semantic units, description and classification

Implication of Research & Conclusion

This research provided besides a cataloguing, an understanding of semantic units that can be applied to design as tabulated in (Table 1). There was no definite way available to understand and articulate Semantic units. This cataloguing provides a basis for communication by making known, a part of, visual language of kundan. Used in form of a visual aid this can make communication easier and effective between a jeweller and his clients.

Future Research

Study further continues into domain to understand form clusters created by these semantic units. Their uniqueness and their interplay with each other create overall form of jewellery. The form clusters, using a mother circle are developed as a research tool to gauge user preference. This study is expected to provide a way to mathematically

interpret design aspects, which have a positive influence on liking/ disliking of that article.

Definitions

Form cluster - Kundan work is made of smallest semantic units used alone or in combination with others. A compilation of semantic units in a certain manner constitute a cluster.

Piece (or Article) - An article, like necklace, is made of form clusters (of semantic units) following a pattern and largely same visual language. Pattern is formed by repetition or scaling or a variety of other devices. These elements make the articles like the alphabet makes the words that in turn make sentences and paragraphs.

Set- A set is a compilation of various articles like ring, bangles, necklace etc. following same visual language.

Glossary of terms

Carat- used in context of diamonds, refers to the measure of weight 200 milligrams. Used in context of gold refers to alloy composition in parts of 24. (Example, 22 carat gold is an alloy that has 22 parts gold and two parts of any other alloy metal, usually silver or copper, per 24 parts of metal mixed weight by weight. They are abbreviated and referred to as 'C' and 'k' respectively in their individual contexts.

Fire- used in context of diamonds, refers to the optical property of total internal refraction.

Stone- used in context of gemstones, usually diamond or a precious/semi precious stone.

Brilliant cuts- used in context of diamonds, refers to polishing (cuts) with high (to very high) optical properties of total internal reflection in various shapes. (Round, oval, pillow, heart, teardrop etc)

Kundan- The word kundan in Hindi means "Pure gold," and is applied to a flush stone closed setting type commonly practiced in India in the ancient past and still in use today for both cabochon and faceted stones.

KundansaaZ- A Jeweler who makes kundan articles, especially setting stones flush. Also called Karighar.

Photograph & Source

Diamond Grading ABC, Handbook For Diamond Grading

Dance of the Peacock: Jewellery Traditions of India

Jewels of The Nizam

Compilation of Design works – M. Panchal & Vinay S.

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