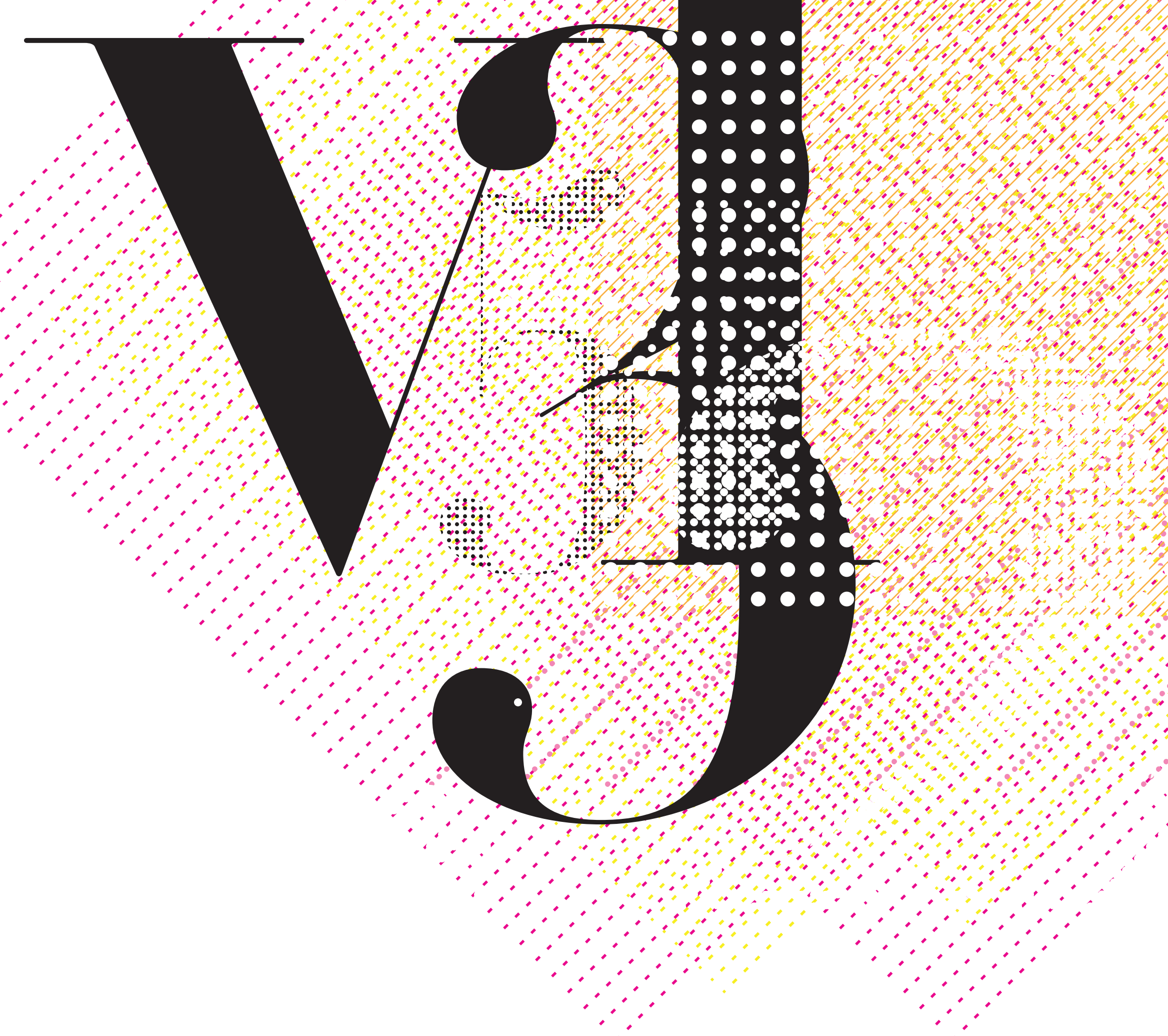

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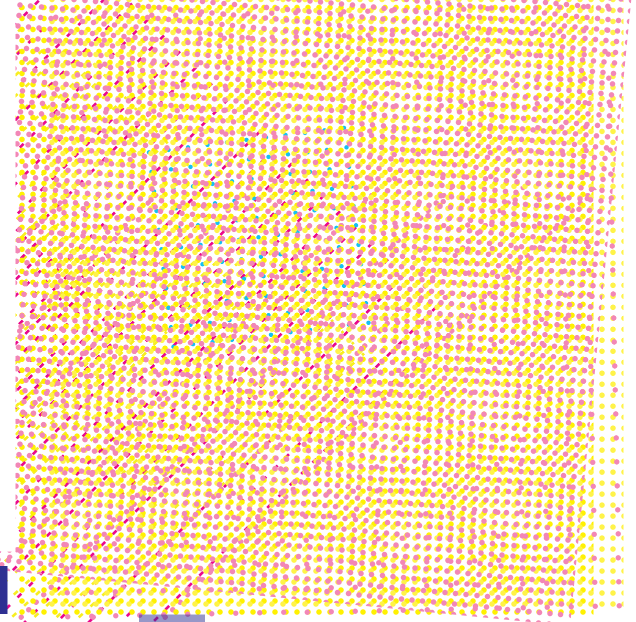

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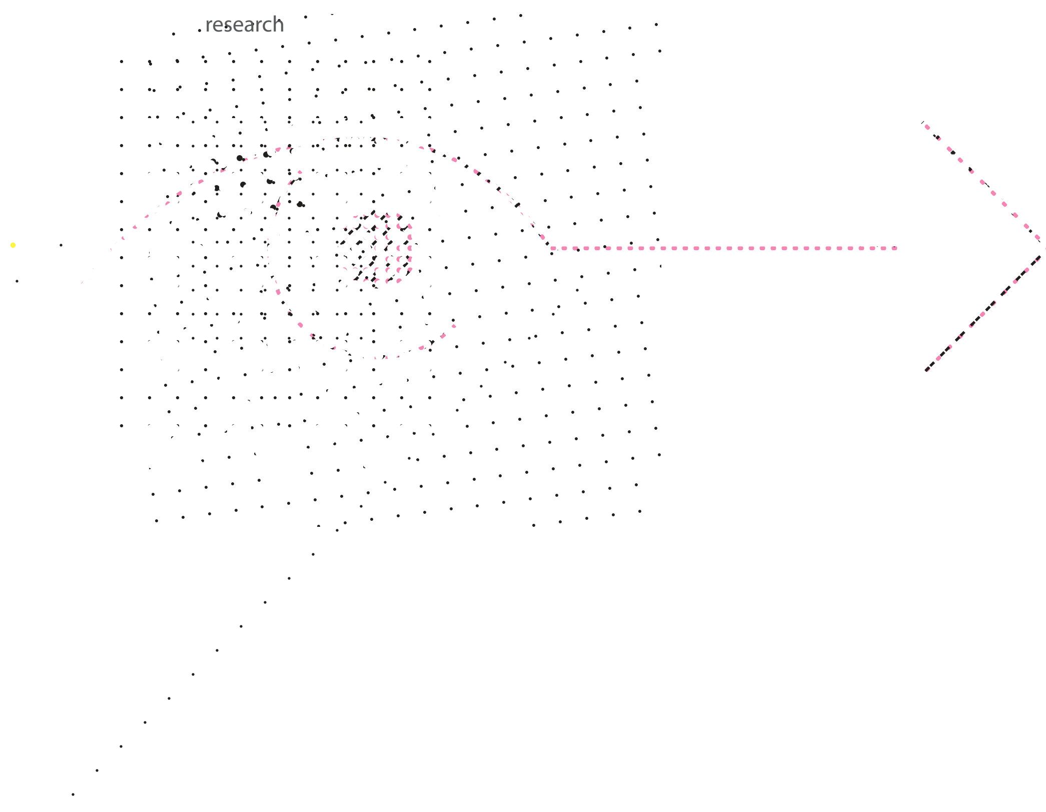

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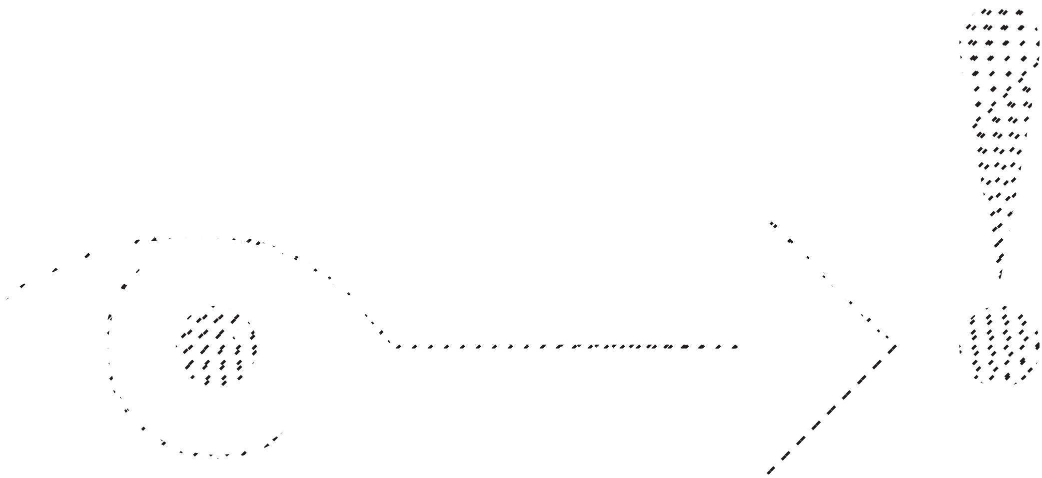

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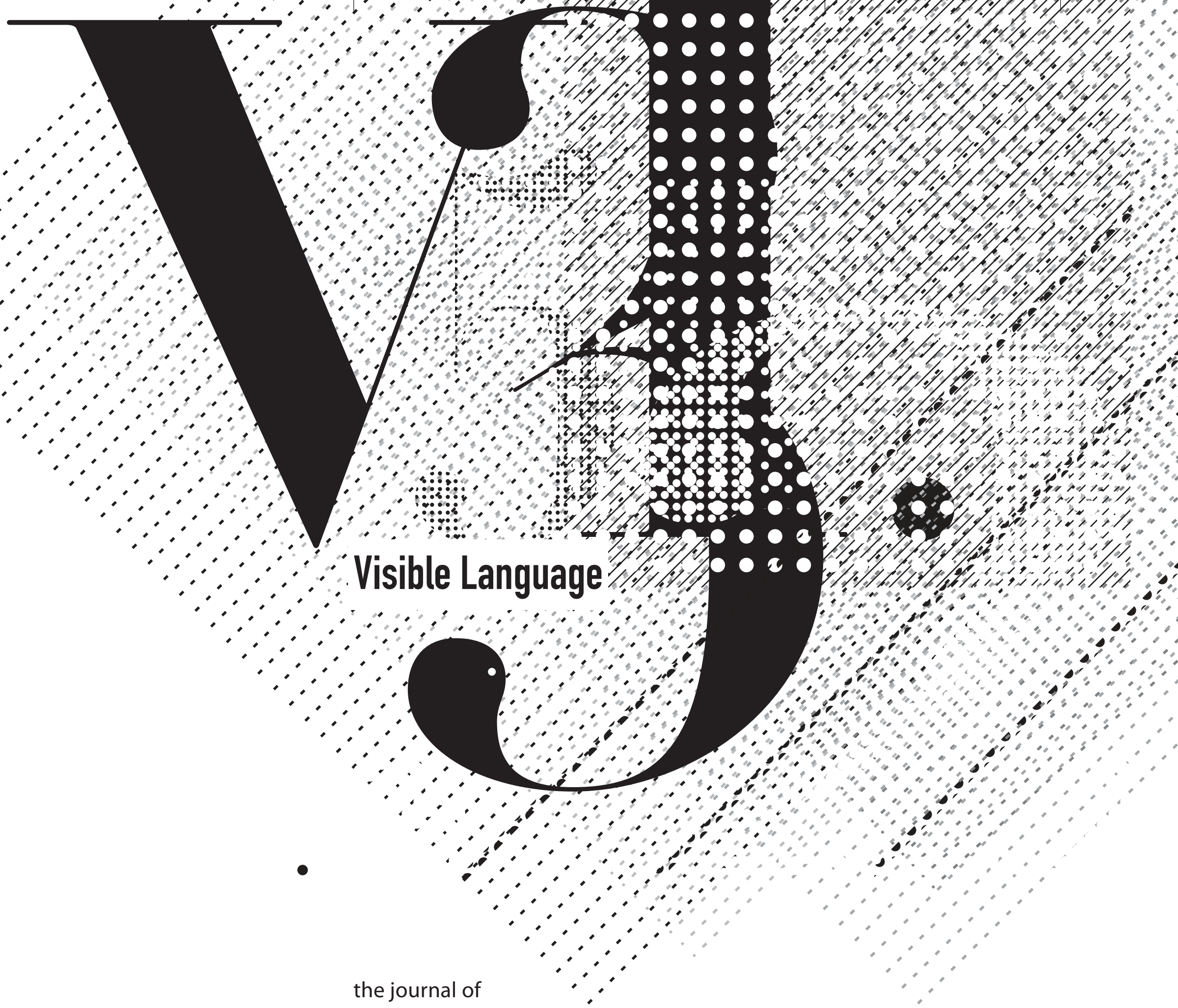

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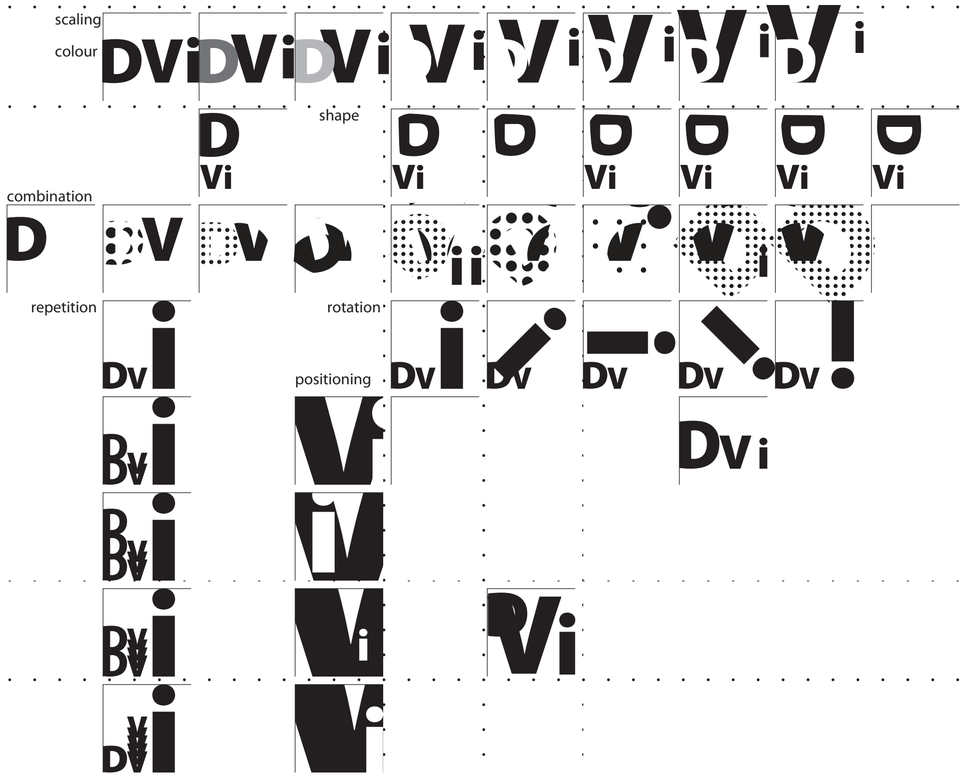

Dynamic Visual Identities: from a survey of the state-of-the-art to a model of features and mechanisms

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João Bicker1&,
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Recent years were marked by a growing demand for dynamic visual identities, observed not only in their increasing numbers but also in the research conducted in the field. In this work, the authors survey the current state-of-the-art, addressing the origins and history of this type of visual identity, as well as the different approaches to analyse and classify them. Current approaches lack objectivity, which is necessary for comparing different dynamic visual identities. The authors propose a novel model for the analysis of dynamic visual identities, based on the difference between variation mechanisms used to attain dynamism and features achieved. In order to assess and evaluate the model, it was applied to a set of dynamic visual identities and the results are discussed. Overall, the model allows an easy comparison between dynamic visual identities and the creation of objective categories. In addition, it is oriented towards the development of new visual identity systems and may serve as a supporting framework for designers to address specific necessities of the client, such as giving an active role to its public and fostering proximity to the brand.

Keywords:

brand design;
case studies;
design model;
dynamic visual identity;
graphic design.

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Introduction

There is an evident demand for visual identities (VI) characterised by variability, context-relatedness, processuality, performativity, and non-linearity (Felsing, 2010, p. 13; Guida, 2014b, p. 122). Many organisations, institutions, museums, and even places, are embracing *dynamic* visual identities (DVI). Although the demand for DVIs has grown in recent years, the concept is not new. An example is the graphic mark of the publishing house Alfred A. Knopf. Since its foundation in 1915, each book is matched to a variation of the borzoi graphic mark, leading to multiple variations.

In the late 1950s, Karl Gerstner introduced the concept of flexibility in the design of VIs with the identity for Boîte à Musique, developed as a program that dictated how it could simultaneously adapt to functional requirements, e.g. proportion, and maintain its overall style and personality (Gerstner, 2007; Hewitt, 2008; Hollington, 2011, p. 9).

Later, in the early 1980s, the collective Manhattan Design created one of the first screen-based graphic marks for the MTV channel, designed by Manhattan Design in 1981, which showed that graphic marks could be adaptive and work as content (Hewitt, 2008), displaying the personality of the channel.

At the beginning of the new millennium, there was an increase in the development of DVIs. For instance, in 2007, the collective Universal Everything and the designer Karsten Schmidt used a generative process to produce a population of over 20,000 unique furry creatures for the VI Lovebytes 2007 festival.

All the aforementioned DVIs challenge the notions that graphic marks should be presented in a static way. Technological advancements, along with the proliferation of the Internet, allowed designers to explore new possibilities that were not practicable a generation ago (Evamy, 2012, p. 8; Kreutz, 2007, p. 12), resulting in a shift towards designing graphic marks as living organisms (Guida, 2014b, p. 122; Kopp, 2015, p. 119; Leitão, 2014, p. 99; Pearson, 2013, p. 26; van Nes, 2012, p. 6).

Scientific research is scarce on the subject as most of the publications only deal with aspects of corporate identity (e.g. (Topalian, 2003; van Riel & Balmer, 1997; Wheeler, 2009)). Authors who address Visual Identity tend to focus on how to manage it (e.g. (Melewar & Saunders, 1998; van den Bosch, Elving, & de Jong, 2006), on the relationship between applications of a VI and its effectiveness as a mean of projecting identity (e.g. (Melewar & Saunders, 2000)), on ways to validate VIs (e.g. (Gabrielsen, Kristensen, & Hansen, 2000) and on the impact of visual elements, such as "logo" (e.g. (Park, Eisingerich, Pol, & Park, 2013; van Riel & van den Ban, 2001)), symbol (e.g. (Green & Loveluck, 1994)), typeface (e.g. (Doyle & Bottomley, 2004)) and colour (e.g. (Hynes, 2009)). Other authors propose guidelines for selecting "logos" based on its visual characteristics and goal of the client (e.g. (Henderson & Cote, 1998)). However, none of the mentioned authors distinguishes between static and dynamic VIs, and their perspectives are mostly logo-centred, addressing visual elements as part of the "logo".

Research related to DVIs addresses the influence of applying movement to a static "logo" on the attitude of the consumer (Brasel & Hagtvedt, 2016; Guido, Pichierri, Nataraajan, & Pino, 2016), typographic transformations of the logotype (Brownie, 2015), different variations occurring in Google Doodles (Jessen, 2015), suitability of logo animation (van Diepen, 2013), shift from static to flexible approaches (e.g. (Biffi, 2016; Guida, 2014a; Hu & Chen, 2010)) and classification models, which are discussed in the following section.

In this work, we comprehensively survey current progress on DVIs, analysing related terminology and existing classification models. Current perspectives lack objectivity and specification, failing to distinguish between mechanisms and features. For these reasons, they are unsuitable for one-on-one comparison as well as general analysis of DVIs. These issues and the current general interest in DVIs are our main motivations for the proposal and application of a model for analysing the variation behaviour of DVIs. We take inspiration from the functional approaches by Gerstner and Manhattan Design which use dynamism to solve a specific problem: allow adaptability to different formats (Boîte à Musique) or use the visual identity as a showcase of the entity (MTV). Our model focus on the relation between using variation mechanisms to attain certain features. As far as we know, no research has been conducted on construction strategies and variation mechanisms (VM) of DVIs. Such has high potential in helping designers in the development of new DVIs by focusing on the communication needs of the client.

The main contributions of this work are: (i) a review of the state-of-the-art on dynamic visual identities (DVIs), focusing on existing terminology and classification approaches; (ii) the proposal of a novel model for analysing the variation behaviour of DVIs; and (iii) the application of the model to a set of DVIs, extracting correlations between variation mechanisms and features achieved, which can be used as guidelines for the development of new DVIs.

The remainder of this paper is organised as follows. The Background section summarises related perspectives of different authors on terminology in the scope of VIs, terminology in the scope of DVIs, and classification of DVIs. The analysis of the existing perspectives resulted in the proposal of a classification model for DVIs, described in the section Defining the Model. In the section Applying the Model we demonstrate the application of this model to a set of DVIs and provide an analysis of the results. The Discussion section addresses general aspects related to the model and its possible applications. Finally, in the Conclusion we summarise the main contributions of this work.

Background

There have been already some attempts to produce a coherent terminology but throughout our research, we could not find one with which we fully agree, at least in the context of this work. In order to guarantee an accurate interpretation of this research, it is important to establish a terminology in the scope of VIs. As a result, we present a terminology based on different authors and divided into three scopes: (i) visual identities (VI); (ii) *dynamic* visual identities (DVI); and (iii) classification of DVIs.

Visual Identities: terminology

Raposo (2005, pp. 30–31) distinguishes three different concepts, which are often confused and wrongly used as synonyms (Topalian, 2003, p. 1119): Corporate Identity (set of values that an Entity assumes as its own), Corporate Image (mental image of the entity by the general public) and Corporate Visual Identity (representation of the corporate identity through the use of visual signs). The system which defines how these visual signs are used together in order to achieve coherence and unity is called visual

TABLE 1.

Elements of a visual identity system

	Olins (1995)	Mollerup (1999)	Kreutz (2001)	Chaves and Belluccia (2003)	Wheeler (2009)	Felsing (2010)	Hollington (2011	Péon (2012)	Raposo (2012)	Nes (2012), Jochum (2013)	Oliveira (2013)	Murdock (2016)	Proposed model
name	x	·	x	x	·	·	·	·	x	·	x	·	·
trademark	·	x	·	·	·	·	·	·	·	·	·	x	·
logo	·	·	·	·	·	x	x	·	·	x	·	·	·
graphic mark	·	·	·	·	·	·	·	·	x	·	x	·	x
logomark	·	·	x	·	·	·	·	·	·	·	·	·	·
mark	·	·	·	·	·	·	·	x	·	·	·	·	·
signature	·	·	·	·	x	·	·	·	·	·	·	·	·
lettermark	·	x	·	·	·	·	·	·	·	·	·	x	·
name mark	·	x	·	·	·	·	·	·	·	·	·	·	·
logotype	·	·	·	x	x	·	·	x	x	·	·	·	x
lettering	·	·	x	·	·	·	·	·	·	·	·	·	·
symbol	x	·	x	x	x	·	·	x	x	·	x	·	x
picture mark	·	x	·	·	·	·	·	·	·	·	·	x	·
brand mark	·	·	·	·	x	·	·	·	·	·	·	·	·
typeface	x	x	·	·	·	·	·	·	·	·	·	·	·
typography	·	·	x	x	x	·	·	·	x	x	x	·	x
typographic features	·	·	·	·	·	x	·	·	·	·	·	·	·
type	·	·	·	·	·	·	x	·	·	·	·	·	·
alphabets	·	·	·	·	·	·	·	x	·	·	·	·	·
typographic palette	·	·	·	·	·	·	·	·	·	·	·	x	·
colour(s)	x	x	x	x	x	x	x	x	x	x	x	·	x
colour palette	·	·	·	·	·	·	·	·	·	·	·	x	·
5th element	·	x	·	·	·	·	·	·	·	·	x	·	·
visual motif	·	·	·	·	·	·	·	·	·	·	·	x	·
complementary elements	·	·	·	x	·	·	·	·	·	·	·	·	·
form	·	·	·	·	·	·	x	·	·	·	·	·	·
graphisms	·	·	·	·	·	·	·	x	·	·	·	·	·
graphic elements	·	·	·	·	·	·	·	·	·	x	·	·	·
shape	·	·	·	·	·	·	·	·	·	·	x	·	·
sound	·	·	·	x	x	·	·	·	·	·	·	·	x
architecture	·	·	·	x	·	·	·	·	·	·	·	·	·
movement	·	·	·	·	·	·	·	·	·	·	x	·	x
motion	·	·	·	·	x	·	·	·	·	·	·	·	·
(visual) language	·	·	·	·	·	x	·	·	·	x	·	·	·
imagery	·	·	·	·	·	·	·	·	·	x	x	·	x
grids	·	·	·	·	·	·	x	·	·	·	·	·	·
layout rules	·	·	·	·	·	·	·	x	·	·	·	·	·

identity (VI) system. According to Leitão (2014, p. 72), a VI system is composed of several basic elements which, despite being named differently from one author to the other, are often the same (see Table 1). Bartholmé and Melewar (2011)also address this topic, focusing on what should be included in the VI system.

In order to avoid such inconsistencies, we based our terminology on the one used by Oliveira (2013), even though we follow a different organisation of the elements. As such, a VI system is composed of the following elements: (i) Graphic Mark – sign used as signature of an Entity which can be composed of a logotype, a symbol, or both. It can also have a descriptive phrase known as tagline (Wheeler, 2009, p. 50); (ii) Logotype – graphic representation of the name of the Entity using letters in an organised, original and unique way (Raposo, 2012, p. 55); (iii) Symbol – graphic and non-linguistic identifier which can vary in terms of iconicity (Raposo, 2012, p. 55); (iv) Typography; and (v) Colour. In addition to these elements, a VI system can make use of others such as imagery and movement.

Dynamic Visual Identities: terminology

In the scope of this survey we focus on the visual identities (VIs) considered *dynamic*. During our bibliographic review, we came across different terms used by different authors to refer to this type of VI. Table 2 compiles the terms we have found, the authors who use them, the corresponding definitions, and some statistics on how much each term is mentioned on the Web. With this comparison, we aim to better understand the range of terms, compare them, and discuss what each one implies.

TABLE 2.

Terms used in bibliography sorted vrtically by number of Web mentions

			Number of Web mentions						
			“logo”	“identity”	“visual identity”	“logotype”	“graphic mark”	Sum	%
Term	Mentioned by	Definition	38.01%	36.85%	24.05%	1.07%	0.01%		
dynamic	(Jochum, 2013; Neumeier, 2003; van Nes, 2012)	[dynamic] always changing and making progress; opposite of static (D1)	213,000	292,000	166,000	15,800	3	686,803	42.44%
flexible	(Cox, 2014; Leitão, 2014; Neumeier, 2003)	able to change to suit new conditions or situations (D1)	166,000	122,000	198,000	914	2	486,916	30.09%
fluid	(Lapetino & Adam, 2011; Pearson, 2013)	capable of changing at a steady rate (D2)	148,000	35,500	2,770	257	0	186,527	11.53%
living	(Hughes, 2012)	[alive] in a state of action; active (D2)	42,900	79,500	14,600	392	0	137,392	8.49%
mutating, mutant, or mutable	(Kreutz, 2001)	[mutate] to change into a new form (D1) / [mutable] that can change; likely to change (D1)	34,730	18,230	3,779	3	0	56,742	3.51%
polymorphic	(Kavan, 2010)	[polymorph] an organism having more than one adult form (D2)	168	35,000	1	3	0	35,172	2.17%
changeable	(Kopp, 2002; Reis, 2011)	likely to change or to be changed; variable (D2)	10,300	13,900	1	2	3	24,206	1.50%
mutatis mutandis	(Coelho, 2013)	making the small changes that are necessary for each individual case, without changing the main points (D1)	–	–	4,100	–	182	4,282	0.26%
metamorphic	(Raposo, 2012)	[metamorphosis] a process in which somebody/something changes completely into something different (D1)	3	251	0	0	0	254	0.02%

Note: The definitions were obtained from the Oxford Advanced Learner’s Dictionary (D1) and from Dictionary.com (D2). The numbers of Web mentions were obtained from Google on July 2017 using search queries with the following structure: “<term> <noun>“ identity design, wherein <term> is the term being quantified and <noun> every noun that usually follows the term, i.e. “graphic mark”, “identity”, “logo”, “logotype”, and “visual identity”.

The most mentioned terms on the Web are, by far, "dynamic" (42.44%) and "flexible" (30.09%). Taking into account the surveyed material we consider that, in this case, web popularity coincides with the academic practices.

Regarding the meanings of the terms, and on the basis of their definitions, retrieved from Oxford Advanced Learner's Dictionary and from Dictionary.com, we can say that all terms relate to the idea of "variation". However, their definitions imply different requirements: "flexible" requires variations adapted to different situations or conditions; "fluid" requires continuous transition between variations; "living" requires autonomous transition between variations; "mutable" requires evident transition between variations; "mutatis mutandis" requires each variation to be related to a necessity or goal; "metamorphic" requires significant difference between variations; and "dynamic", "polymorphic" or "changeable" only require one or more variations.

Considering the requirements of each term, we can say that (i) the terms "dynamic", "polymorphic", and "changeable" are equivalent and more comprehensive than the remaining ones according to what their definitions imply; and (ii) more importantly, given that several terms may be used to characterise one VI, we consider that the most specific ones should be regarded as qualities and not as types of VIs. These are included in the model that will be presented in a later section.

Based on the analysis presented above, we adopt the term "dynamic" visual identities (DVIs) when referring to the VIs that use multiple variations resulting from the change of one or more elements of their visual identity system.

Dynamic Visual Identities: existing perspectives

Having described the terminology to be used and identified the elements that compose a VI system, we will now shift to DVIs as they are the subject of this survey. Different perspectives exist when considering the terminology and classifications of DVIs: Kreutz (2001), Felsing (2010), Hollington (2011), Nes (2012), Jochum (2013), Pearson (2013), and Murdock (2016). In the following paragraphs, we describe these perspectives, maintaining the original terms in order to avoid loss of meaning (e.g. we interpret "mark" by Pearson (2013) as graphic mark).

Kreutz (2001, 2007) identifies two main groups of VIs. The first group, Conventional, includes VIs characterised by a rigid and highly patternized system and can be divided into Traditional / Stereotypical – using symbols that belong to the public collective memory – and Modern / Arbitrary – imposing symbols that are not initially recognised by the public. The second group identified by Kreutz is the Mutant / Unconventional / Postmodern that includes VIs that are flexible, dynamic and based on variation of their elements. Mutant VIs can also be divided into two categories: (i) Programmed – only vary some elements of the identity for a determined period of time (Kreutz, 2007, p. 4) which we understand as having a limited number of variations; and (ii) Poetic – the variations occur spontaneously, without any previously defined rules and depending only on the creativity of the current designer (Kreutz, 2005, p. 130, 2007, p. 8). An example given by Kreutz is the DVI of MTV.

Despite this description of spontaneous variability in Poetic VIs, Kreutz (2001, p. 82) also mentions that no change is radical as it is always possible to identify a structure or skeleton of the identity – in the VI of MTV this structure is its "magic box". This idea of a base structure is further developed as Kreutz (2012, p. 5) describes seven phases of the development of a Mutant VI, and in which: phase four is to determine the base VI (compared to a skeleton) from which the mutations may arise; phase five is related to defining the Mutant characteristics; phase six is the identification of possible variation sets under the same theme. According to Kreutz, base VI guides the mutations without establishing a limit.

Kreutz (2007, p. 9) also assumes that "migrations" can occur: a Conventional VI can become Mutant and, in order to attend communicational necessities, a VI which is already a Programmed Mutant can evolve into a Poetic Mutant. Despite being very high-level, this perspective is useful to differentiate Dynamic – which Kreutz calls Mutant – from Static VIs. The following perspectives focus on the first type.

Felsing (2010) uses the term "flexible" and describes a set of six variation processes, focusing on the methods to create variability when developing a VI and centring the analysis on cultural and public contexts. The processes are: (i) Content and container – mask / grids, in which there is always a constant shape and the change occurs in its content; (ii) Elements and sequence – movement / change of perspective, in which there is a sense of movement; (iii) Theme and variation – transformation, in which there is a variation process applied to singular signs (shape / size / colour; abstraction degree; and means of representation); (iv) Combinatorics – rapports / modules and elementary construction kits, in which there is the use of combination / repetition of basic elements, most of which are modular; (v) Element and structure – permutation, in which there is a combinatory process of a great number of elements; and (vi) Interaction – control factors / transfer and open form, in which there is the incorporation in the design of real-time processes or data in a dynamic manner.

Hollington (2011) also uses the term "flexible" but presents a different perspective based on four different types of flexibility (adapt, transform, move and interact), which can be achieved by six different types of VI systems. The descriptions for the four types of flexibility are: (i) Adapt (A) – recognises that the future is not finite and change is inevitable. A fixed framework plays an important part in allowing change to happen; (ii) Transform (T) – a system based on a set of rules that translates changing information into a visual representation; (iii) Move (M) – system variability achieved through manoeuvrability of different forms on a grid; and (iv) Interact (I) – systems that rely on some sort of audience/consumer interaction to define the identity.

The six different types of visual identity system are: (i) Rearrangeable logo – the system is based on the interaction between forms and grids, which can be fixed morphing or interactive (achieves M and I); (ii) Deconstructable logo – the logo is composed of different forms that come together to unify a group or different sections of an entity but also work separately to represent the individual branches (achieves M); (iii) Variable content logo – the system relies on a fixed container to maintain recognition between variations, while the content within that container changes, e.g. City of Melbourne (achieves A); (iv) Variable container logo – the system relies on a central constant element that acts as the logo anchor, allowing recognition from variation to variation, e.g. AOL (achieves A); (v) Single logo – the system works by using the most basic representation of the organisation in the form of a single logo which stays constant while the other elements change (achieves A); and (vi) Language-like system – the system is non-logo based and relies on the visual language to define an overall style (achieves A, T and I).

Nes (2012) uses the term "dynamic" and states that a system becomes dynamic when one of its components varies. Nes introduces six groups in which a DVI system can be included based on the behaviour of its components: (i) Container – there is a change in the content (textures, colours or patterns) of a fixed graphic shape; (ii) Wallpaper – the foremost graphic element remains constant and the background changes; (iii) DNA – the system is based on a custom visual language; (iv) Formula – uses a grid or a set of rules that structures how the rest of the elements are used without defining the elements themselves; (v) Customised – allows the user to interact and influence; and (vi) Generative – uses computational techniques based on a set of rules and allows the VIs to react to external data. According to Nes (2012, p. 7), by maintaining at least one static component, it is possible to achieve both variation and recognition.

Jochum (2013) also uses the term "dynamic" and presents a refinement of the models by Felsing (2010) and Nes (2012). Jochum uses a Flexibility chart that shows the degree of dynamism of a VI system based on its components – the same as the ones described by Nes (see Table 1). The model described is called "Flexible Design Systems" and is divided into six different ways to turn brands into DVIs: (i) Filling and Container – includes elements that work as containers and are filled or covered with colours, patterns, images, etc.; (ii) Background and Layer – changes occur in the background behind a static element; (iii) Combination and Composition – uses combination of various elements that belong to a set defined in the system; (iv) Transformation and Adaption – consists in the transformation of elements based on parameters like colour, data or media; (v) Customisation and Collaboration – allows the user to contribute; and (vi) Automation and Transfer – uses technological tools such as logo generators, software tools or computer programs to automate the design process. Jochum (2013, p. 21) also states that the majority of the visual identities use more than one of these methods of dynamism.

Pearson (2013) focuses on brand protection issues regarding "fluid marks" and describes a taxonomy based on "species". The proposed taxonomy assumes the existence of hybrid marks that exhibit characteristics of more than one species and is characterised as open, given the inevitability of new species appearing (Pearson, 2013, p. 27). The seven species are: (i) Ornamenting the mark – essential characteristics are constant but new matter is added, typically for a limited period of time; (ii) Reinterpreting the mark in different media – mark appears in different ways on different occasions or media; (iii) Filling a frame – frame or three-dimensional container displays different content in the same medium; (iv) Changing the background – mark appears juxtaposed against different content; (v) Employing moving designs – technologically enabling images that constantly move to replace a conventional logo, not having either a fixed beginning or end, which results in an infinite number of possibilities. Some of them are automatic and others allow the user to interact; (vi) Adopting multiple designs – uses a "relatively small nuclear family" of marks or variants; and (vii) Using ever-changing designs – constantly changes the used mark.

Murdock (2016) uses the term "dynamic" and presents three techniques for the creation of DVI systems. These three techniques presented below go from simple to complex and from more to less control of the outcome: (i) Modularity, (ii) Permutation and (iii) Open form. The first technique, Modularity, uses a standardised unit or set of units as building blocks. It is the simplest approach, it has the highest level of control over the outcomes of the design process, and it sets the foundation for the other two techniques. The Permutation technique is similar to modularity but, whereas modularity seeks to fix all parametric variables as constants, permutation fixes only some. It has less control than modularity and higher level of variability in the outcomes. An example given by Murdock is the La Fonda del Sol identity in which the system is composed of a constant custom logotype, an unusually high number of typefaces, an unusually high number of colours, and a modular-like sun motif (symbol) in which the facial features change. The system works by using combinations of the several elements. The last technique, Open form, uses real-time inputs by tying the system variables to a natural cycle or process that determines when and how these elements change. It makes the designer "give up almost all control" (Murdock, 2016, p. 54). An example given is the Nordkyn VI.

Murdock (2016, p. 56) states that modularity does not produce fully DVI systems and that it can be seen as a bridge between static and dynamic VI design. Additionally, the three techniques are described as still needing some refinement and Murdock (2016, p. 75) admits that other techniques might also exist.

Review and Analysis

After describing the existing perspectives on DVIs, two things can be concluded: (i) there is not a full agreement among them in terms of terminology, and (ii) the existing perspectives are somehow redundant or incomplete. For these reasons, the analysis and comparison of the existing perspectives proved to be a difficult task.

Some of the existing perspectives cannot be regarded as classifications. One example is the book titled "Dynamic Logo" by Lin (2013), which presents examples of DVIs organised by brand sector (trade, services, architecture, culture, tourism, etc.). In a similar way, we consider the system proposed by Felsing (2010) as a set of topics related to the development of DVI systems rather than categories. For example, the topic "theme and variation: transformation" is described by Felsing (2010, p. 79) as being "about variation processes applied to singular signs" – one cannot refer to it as a category as it is too abstract and no specifications are given. In addition, not all the examples given are DVIs, e.g. Felsing presents some interactive installations.

Other models, despite presenting what can be described as categories, are too high-level, e.g. (Kreutz, 2001). Also, some have categories that are not specific enough on what they are about or on which visual mechanisms are used, e.g., "DNA" and "formula" presented by Nes (2012). This sometimes leads to a categorisation in which a VI system belongs to multiple categories, e.g. when looking at the VIs belonging to the "filling Frame" category (or "species") by Pearson (2013), one can argue that the variation occurs in a very similar way to the ones belonging to the "reinterpreting the mark in different media"; and the category "ever-changing designs" by Pearson (2013) is also widely used by VIs belonging to other categories. Moreover, in some perspectives, the distinction between categories is sometimes difficult and somehow subjective. It is important to mention that we do not consider that categories need to be mutually exclusive. However, we believe that they should be specific enough in order to minimise the number of categories to which one DVI belongs.

Some interpretation problems arise due to a bad choice of words or examples: Nes (2012, p. 8) defines "generative" category as able to "reflect the world it is living in" but when looking at the examples given – Pigmentpol or Lovebytes 2007 (van Nes, 2012, p. 142,150) – it is not obvious how they reflect the world. Moreover, the term generative does not typically require reflecting the environment.

One of the main issues with the described perspectives is that most of them mix construction mechanisms/techniques with features/characteristics, presenting them as being at the same level. For example, we consider that in Nes (2012), "container" is a mechanism to achieve variation and that "generative" is a characteristic. Nes (2012, p. 191) considers, for instance, the Nordkyn VI as "generative". However, if this visual identity did not react to external input, thus becoming non-generative according to his definition, the used VMs (shape and colour variation) would still be the same. More examples of confusion between mechanisms and features are identified in Table 3 using "*".

Some of the perspectives mix mechanisms and features in a different way: they differentiate two categories that use the same VM by using a feature. In Pearson (2013), the only difference between "filling frame" and "reinterpreting the mark in different media" is that in the former the variation occurs in the same medium and in the latter it occurs when the medium changes, i.e. the VM remains the same and it can be seen as "filling a frame" in both categories. Other examples use the difference in terms of number of possible variations ("adopting multiple designs" and "using ever-changing designs" by Pearson) or in terms of number of elements used in

Kreutz (2001)	Felsing (2010)	Hollington (2011)		Nes (2012)	Jochum (2013)	Pearson (2013)	Murdock (2016)
Mutant VI	Flexible VI	Flexible VI		Dynamic VI	Dynamic VI	Fluid marks	Dynamic VI
		Type of System	Type of Flexibility *				
Programmed	Content and container	Rearrangeable logo	Move and Interact *	Container	Filling and Container	Ornamenting the mark	Modularity
Poetic	Elements and sequence	Desconstructable logo	Move *	Wallpaper	Background and Layer	Reinterpreting the design in ≠ media *	Permutation
	Theme and variation	Variable content logo	Adapt *	DNA	Combination and Composition	Filling a frame *	Open form *
	Combinatorics	Variable container logo	Adapt *	Formula	Transformation and Adaption	Changing the background	
	Element and structure	Single logo	Adapt *	Customised *	Customisation and Collaboration *	Employing moving designs *	
	Interaction *	Language-like systems	Adapt, Transform and Interact *	Generative *	Automation and Transfer *	Adopting multiple designs *	
						Using ever-changing designs *	

TABLE 3.

Existing perspectives on DVIs

Note: We consider the categories marked with '*' as features of DVIs.

the system ("combinatorics" and "elements and structure" by Felsing (2010)). Hollington (2011) addresses this issue by presenting four types of flexibility, which can be seen as features, and six types of VI systems, which can be seen as construction mechanisms. This way features and mechanisms are distinguished from each other.

Hollington (2011) also gives importance to the origin of dynamism by having categories in which the dynamism is given only by the "logo" and others in which the dynamism is given by the system as a whole ("single logo" and "language-like systems"). This relates to whether or not the VI is focused on the graphic mark. Such issue is disregarded by the other perspectives.

On the other hand, we think that the perspective of Hollington (2011) is incomplete as it excludes many VIs (e.g. the ones in which the variation is not related to a grid but to a shape transformation on the "logo"). Furthermore, the term "variable content logo" excludes VIs that use the "variable content" mechanism in elements that are not the "logo". We consider that the other perspectives are also incomplete and leave out several VIs (e.g. Nes (2012) does not consider shape/colour transformations and Murdock ignores, for example, VIs based on *content variation*).

Despite this, we consider that the perspective of Hollington (2011) is the one more aligned with ours as it addresses the two aforementioned issues: (i) identifying the identity focus and (ii) distinguishing between variation mechanisms and features. Such issues are the basis of our model.

Defining the Model

In this section, we present a novel model for the analysis of DVIs. In the first part of this section, we intersect existing perspectives. In the second part, we define our model.

Intersecting existing perspectives

The analysis of other perspectives, conducted in the previous section, allowed us to identify the aspects that a model for DVI analysis should consider, either because they were addressed by an existing perspective or because we identified them as issues not yet resolved. The list of these aspects

	Kreutz (2007)		Felsing (2010)						Hollington (2011) VIS Type						Hollington (2011) Flexibility				Nes (2012)						Jochum (2013)						Pearson (2013)							Murdock (2016)		
	Programmed	Poetic	Content & container	Elements & sequence	Theme and variation	Combinatorics	Element & structure	Interaction	Rearrang. logo	Desconstr. logo	Var. content logo	Var. container logo	Single logo	Language-like sys.	Adapt	Transform	Move	Interact	Container	Wallpaper	DNA	Formula	Customised	Generative	Filling & Container	Background & Layer	Comb. & Composition	Transf. & Adaption	Custom. & Collab.	Autom. & Transfer	Ornamenting the	Reinterpreting design	Filling a frame	Changing	Moving designs	Multiple designs	Ever-changing	Modularity	Permutation	Open form
Graph. mark focused	·	·	·	·	·	·	·	·	x	x	x	x	–	–	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Colour variation	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	·
Combination	·	·	·	·	·	x	x	·	?	·	·	·	·	x	·	·	·	·	·	·	x	·	·	·	·	·	x	·	·	·	·	·	·	·	·	·	·	?	x	·
Content variation	·	·	x	·	?	·	·	·	·	·	x	x	·	·	·	·	·	·	x	x	·	?	·	·	x	x	·	·	·	·	x	x	x	x	·	·	·	·	·	·
Positioning	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Repetition	·	·	·	·	·	x	?	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	x	·	·
Rotation	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Scaling	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Shape transformation	·	·	·	?	?	·	·	·	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	·
Flexible	·	·	·	·	·	·	·	·	·	·	·	·	·	·	x	·	·	·	·	·	·	·	·	·	·	·	·	x	·	·	·	x	–	·	·	·	·	·	·	·
Fluid	·	·	·	x	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	x	·	·	·	·	?
Generated	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	x	·	·	·	·	·	x	·	·	·	·	·	·	·	·	·	·
Informative	·	·	·	·	·	·	·	·	x	x	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Participatory	·	·	·	·	·	·	·	x	·	·	·	·	·	·	·	·	·	x	·	·	·	·	x	·	·	·	·	·	x	·	·	·	·	·	·	·	·	·	·	·
Reactive	·	·	·	·	·	·	·	?	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	x	·	·	·	x	·	x	·	·	·	·	·	·	·	·	·	x

TABLE 4

Intersection between identified aspects and existing perspectives.

Note: Characters meaning: 'x' – direct mapping; '?' – resemblance/similarity; '-' – negation (e.g. "programmed" by Kreutz (2007) is defined as not being unlimited.

can be seen in Table 4 (leftmost column), which shows its intersection with perspectives by other authors. As one can observe, no existing perspective covers all aspects.

The main problem that we identify in the perspectives presented by other authors is that they tend to be too high-level and do not make a clear distinction between variation mechanisms (VMs) and features. The aspects shown in Table 4 (leftmost column) are vertically organised according to this distinction. In addition, we identify whether the VI system focuses on the graphic mark. Such is only addressed by Hollington (2011), who presents categories which are specific for the graphic mark and others for the system as a whole.

Some of the aspects that we identified can be seen as belonging to categories from the perspectives by some other authors, which we consider too generic and in need of further specification. For instance, we consider that the concept "transform" should be divided into *colour variation, positioning, rotation, scaling,* and *shape transformation*.

On the other hand, we consider some categories can be merged. For instance, although "container" and "wallpaper" are presented as different categories by some authors, we think that they should be merged into *content variation*, referring to a space where content is (re)placed in background or foreground and varying in terms of area limiting. In a similar way, we consider that the term *combination* includes the category "permutation" mentioned by some authors, as we consider that there is not enough reason to distinguish them.

Regarding aspects that we consider as features or characteristics, some of them are present in the perspectives by other authors despite using different terminology (e.g. *participatory* and *generated*). The other features were originated from: the terminology analysis described in subsection *Dynamic Visual Identities: terminology* (e.g. *flexible* and *fluid*), in which some terms were considered specific enough to be seen as features; and the necessity to differentiate between two categories (e.g. the feature *unlimited* that distinguishes the categories "programmed" and "poetic" by Kreutz).

Proposed Model

Based on the information gathered and the analysis made in the previous subsection, we now describe our proposal of a classification model to analyse how DVIs work and what they can achieve. As we are dealing with Visual Identity systems, we believe the categorisation should be based on how variation is visually done using the components of the VI system. This way, the proposed model considers three aspects: (i) identity focus, (ii) variation mechanisms, and (iii) features.

Identity focus

The first aspect that we consider is whether or not the VI is focused on a graphic mark, i.e. the entity is identified and recognised by a graphic mark. For instance, the supermarket chain Priba, designed by Allied International Designers and Geoff Gibbons in 1973, is identified by a graphic mark that frames an array of images, colours, and patterns to reflect its diversity of products and services. On the other hand, for instance, the Walker Art Center, designed by Andrew Blauvelt and Chad Kloepfer in 2005, is identified by a graphic language composed of an extensive toolkit of bars, stripes, and chevrons. This way, we consider that Priba DVI is graphic mark focused whereas Walker Art Center is not.

Variation mechanisms

The second aspect that we consider is how VIs change visually. The following paragraphs present different mechanisms that enable variation in VIs. Note that (i) one VI can use more than one variation mechanism; and (ii) one VM can be applied to multiple elements of the VI system. There are eight variation mechanisms: *colour variation, combination, content variation, positioning, repetition, rotation, scaling,* and *shape transformation*. These are described below and we use image schemas to illustrate how each one works.

Colour variation

Colour variation – there is a graphic element that changes in colour (see *Figure 1*). For instance, in the VI for the concert hall Casa da Música, designed by Stefan Sagmeister in 2007, the colours of the graphic mark are picked from an image related to each event using a custom computer program.

Figure 1.

Usage of the *colour variation* mechanism. The same element (square) changes in colour. Six possible versions are shown.

Combination

Combination – there is a combination of different graphic elements that belong to the VI system (see *Figure 2*). For instance, in the VI for the restaurant La Fonda del Sol, designed by Alexander Girard in 1960, a set of facial features, sun rays, enclosing shapes, and colours are combined to create a vast range of sun designs (Murdock, 2016, p. 20).

Figure 2.

Usage of the *combination* mechanism with a set of eight different elements (square, cross, diamond, star, triangle, pentagon, full circle and outline circle). Six possible versions are shown.

Content variation

Content variation – there is an area or space where different imagery is placed, be it in the background or foreground (see *Figure 3*). For instance, the VI for the Design Academy Eindhoven, designed by The Stone Twins in 2010, provides a canvas consisting of three bars where people can handwrite the name of the school, changing the content at each iteration and creating numerous versions of the graphic mark. This variation mechanism is further analysed by Jessen (2015).

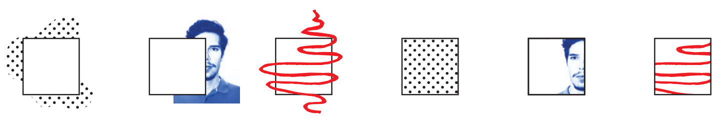


Figure 3.

Usage of the *content variation* mechanism. Six examples are shown. The content area can be in the background (first and second examples on the left) or in the foreground (third example on the left). It can also be clearly limited (e.g. inside of a square, on the three rightmost examples) or not (three leftmost examples).

Positioning

Positioning – there is a graphic element that is positioned in different ways (see *Figure 4*). For instance, the VI for the animation production company Boolab, designed by Mucho in 2009, employs this VM to create numerous arrangements of the four lines and five circles that form the word "boolab".

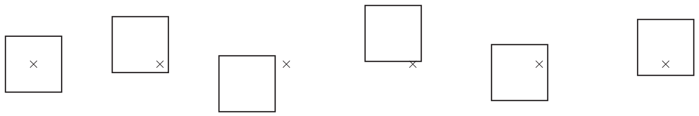


Figure 4.

Usage of the *positioning* mechanism. The same element (square) is positioned differently in relation to the same point (represented with a cross mark). Six versions are shown.

Repetition

Repetition – there is a repetition of the same graphic element (see *Figure 5*), which may be ruled by a grid. For instance, the VI for the Mobile Media Lab, designed by FEED in 2008, employs this VM to repeat symbols independently or layered one over another.

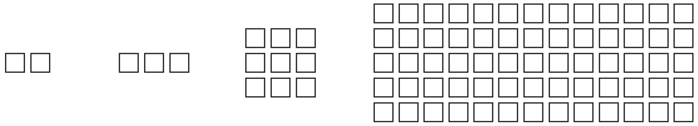


Figure 5.

Usage of the *repetition* mechanism with a graphic element (square). Four possible versions are shown.

Rotation

Rotation – there is a graphic element that is rotated (see *Figure 6*). For instance, the VI for the eyeglasses store Optica, designed by Vlad Likh in 2013, employs this VM to rotate a pair of glasses in a three-dimensional space.

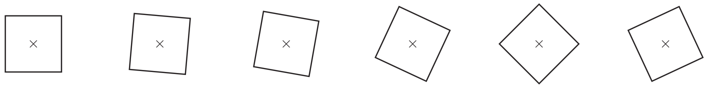


Figure 6.

Usage of the *rotation* mechanism. The same element (square) is rotated in relation to the same point (represented with a cross mark). Six possible versions are shown.

Scaling

Scaling – there is a graphic element that changes in size (see *Figure 7*). For instance, the VI for the media production agency IDTV, designed by Lava in 2008, is based on the combination of four different modules at different scales.

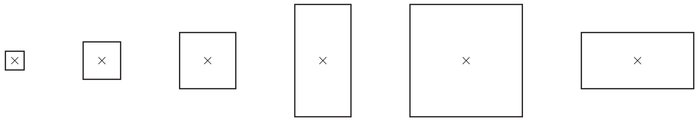


Figure 7.

Usage of the *scaling* mechanism. The same element (square) is scaled in relation to the same point (represented with a cross mark). Six possible versions are shown.

Shape transformation

Shape transformation – there is a graphic element that changes in shape (see *Figure 8*). For instance, the VI for the Brooklyn Museum, designed by 2x4 in 2004, employs this VM to continuously morph a seal.

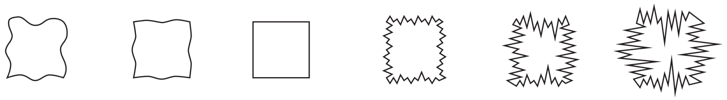


Figure 8.

Usage of the *shape transformation* mechanism. The shape of an element is transformed. Six possible versions are shown.

Features

The third aspect that we consider is the set of features that can be found in DVIs. Note that one DVI can have multiple features.

Flexible – the DVI adapts to different contexts in which it is applied, either in terms of media or content. An example of adaptation to media can be observed in the VI for the record shop Boîte à Musique, in which shape transformation is used to make it suitable for different formats (e.g. paper sizes). An example of adaptation to content is the DVI for Casa da Música, which uses colour variation to change its graphic mark according to images related to each event that takes place at this concert hall.

Fluid – the DVI is capable of changing in a continuous way. Most of the times, fluidity provides to DVIs a wide spectrum of possible variations. For instance, the VI for the bank Kamnin, designed by b2s6 in 2013, is based on a three-dimensional layered form that creates a feeling of continuous motion.

Generated – the variations of the DVI are generated by an algorithm. The designer develops an algorithm that generates one or more elements of the VI system with some degree of autonomy and, in some cases, randomness. Designing by coding allows the designer to create custom tools that lead to new kinds of imagery and highly customised designs, e.g. DVI for Lovebytes 2007.

The designer may also algorithmically provide autonomy to the VI system, allowing it to evolve over time and be open-ended, or to define how it behaves in a specific context, how it interacts with people, and/or how it reacts to input data in real-time. For instance, the VI for the organisation Rhizome, designed by Surface in 2001, was generated on-demand each time it was viewed on the website depending upon the internet protocol (IP) addresses of the last four visitors. This VI was one of the first DVIs generated by computer code (Rhizome, 2001).

Most of the DVIs that are *generated* have a "logo generator", which is a computer program that generates the variations of the graphic mark. One of the very first is the one developed for Casa da Música (Guida, 2014b, p. 123).

Informative – the DVI provides information to the audience. This feature is often used to communicate messages or to identify products, services, sections, or personnel. For instance, Google, since its launch in 1998, regularly changes its graphic mark with the Google Doodles, designed by Dennis Hwang in 1998, to celebrate major events such as anniversaries or special days. Some DVIs can be more or less meaningful depending on how much information can be extracted from them.

Participatory – the DVI allows people, other than their designers, to be involved and influence its design. Viewers become users by allowing them to customise and collaborate (Armstrong & Stojmirovic, 2011, p. 11). Depending on how much the VI is open to the influence of the audience, the visual outcomes may become more or less unpredictable.

In some cases, this feature enables the audience to provide its own content. For instance, the graphic mark of the OCAD University, designed by Bruce Mau Design in 2011, contains a frame that can be filled with illustrations, scribbles, or pictures by students or whoever gets in touch with it. Each year, the university invites a group of graduating students to design their own versions of the graphic mark. In other cases, the audience may configure a provided set of elements. For instance, the VI for the hair salon Get Up, designed by Alexis Rom studio in 2007, employs a stamping process to enable its stylists and customers to have fun constructing their graphic marks and leaving their personal imprints.

Reactive – the DVI automatically reacts to external input. A data-driven process is used to autonomously design one or more elements of the VI system. The use of input data, real-time or not, enables the VI to become autonomous and alive. For instance, the Visit Nordkyn graphic mark, designed by Neue in 2010, is affected by a feed of weather statistics. It constantly changes its shape and colour depending on current wind conditions and temperature, respectively. On the website, this graphic mark updates every five minutes, reflecting the weather conditions in the region. Similarly to the feature *participatory*, depending on the impact of the input data on the design of the VI, the visual outcome may become more or less unpredictable.

Unlimited – the variations of the DVI are infinite. For instance, the VI for the Web service provider Aol., designed by Wolff Olins in 2009, features an ever-changing background that evokes the multiplicity and the dynamic nature of the Web by showing a wide range of objects.

Applying the Model

In this section, we test the developed model by applying it to a set of DVIs and then analyse the results in different aspects. In order to apply the model, we firstly built an archive of DVIs and then we implemented a web visualization to aid in the analysis by allowing the user to visually explore the archive.

Archive

We created a comprehensive archive of DVIs that we analysed with the proposed model. The complete archive can be seen at cdv.dei.uc.pt/2018/dynamic-identities/archive. A sample of the archive, composed of 80 DVIs, is presented in Table 5.

In the selection of DVIs we considered three aspects: (i) diversity in terms of how visual dynamism is implemented and which characteristics and benefits are achieved with it; (ii) DVIs that are considered by existing bibliography (e.g. (Lin, 2013; van Nes, 2012)) and are commonly regarded as turning points in the history of DVIs; and (iii) the coverage of a long time span, aiming to find DVIs from different time periods.

Using the aforementioned criteria, we collected a large set of DVIs designed in different years for many types of entities, as well as data related to them. The information was gathered from the available resources, including books, e.g. (Lin, 2013; van Nes, 2012), articles and web pages. However, there is a lack of information about some VIs. In some cases, only a few images without description were found. Nevertheless, we analysed the VIs as accurately as possible.

The application of the model to a set of 80 DVIs was conducted by three people with background on graphic design. The followed methodology consisted in a four-step process: (S1) each person applied the model to each DVI individually, identifying possible issues; (S2) the results of the applications by the three people were set side by side to identify different assessments or lines of reasoning; (S3) the divergences and issues identified were discussed until full agreement was reached and the conclusions were used to improve the model; (S4) a final application of the model to all DVIs was conducted in group in order to validate it. The application of the model to some DVIs was difficult for two reasons: (i) the materials available were scarce; and (ii) different combinations of VMs may lead to similar results. During S2, the opinion differences and the questions that emerged were addressed, aiming for full agreement. In some cases, in order to achieve full agreement, changes in the model were required. These questions are presented in the General analysis section.

In our analysis (see Table 5), a question mark is used to point out situations when we were not able to determine with certainty whether or not the VI involves a specific VM or feature. For instance, some VIs have a question mark in the feature *generated* since we are not sure about the presence of this feature, despite seeming to possess *generated* characteristics.

In Table 5, one can see the VIs arranged along the rows and their attributes along the columns. The four leftmost columns present details about each VI: name of the entity, designer(s), year of the design, and sector of the entity. In the fifth and sixth columns, we analyse the presence of dynamism in the graphic mark, individually in its symbol and logotype, if any exists. The remainder of the table is structured according to our model, which is described in the previous section, and is divided into three groups of columns: "graphic mark focused", "variation mechanisms", and "features". The "variation mechanisms" are divided into "graphic mark" and "system" to indicate where each VM is used, i.e. in the graphic mark and/or in another element of the VI system. The same VM should appear simultaneously in both sides ("graphic mark" and "system") only when it is used for different purposes. When the same VM is used in both sides with the same purpose, we only indicate its use in the side of the identity focus.

Web Visualization

The complexity of the analysis table (see *Table 5*) makes it difficult to compare and correlate the different properties of the DVIs studied. For this reason, we developed an interactive web-based visualization tool to study the data (see *Figure 9*). One can access the visualization tool at cdv.dei.uc.pt/2018/dynamic-identities. Additionally, one can also see a video demo of the visualization tool at cdv.dei.uc.pt/2018/dynamic-identities/demo.mov. The visualization automatically fetches data from the archive previously described. This way, any update on the archive is automatically used in the visualization.

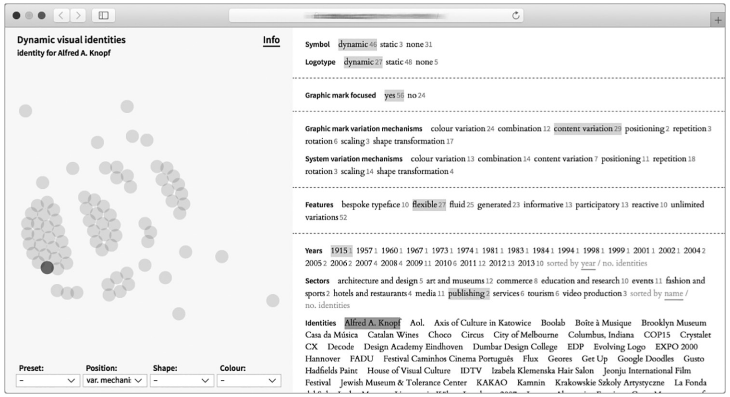
The visualization comprises two interrelated parts: a graph and an index. A two-dimensional force-directed graph is employed, where each node represents a DVI. In short, it allows the assignment of forces among the set of edges that connect the nodes based on their proximity. These forces are then used to simulate the motion of the nodes to minimise the number of crossing edges. See, e.g., (Kobourov, 2012) for more details about force-directed graphs. In this work, we set the proximity of the nodes according to their similarity in terms of VI properties, e.g., identity focus, variation

TABLE 5

					Variation mechanisms: Graphic mark side									Variation mechanisms: System side									Features						
Identity	Year	Symbol	Logotype	Graph. mark focused	Colour var.	Combination	Content var.	Positioning	Repetition	Rotation	Scaling	Shape transf.	Sum	Colour var.	Combination	Content var.	Positioning	Repetition	Rotation	Scaling	Shape transf.	Sum	Flexible	Fluid	Generated	Informative	Participatory	Reactive	Unlimited
Alfred A. Knopf	1915	D	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	·	·	·	·
Boîte à Musique	1957	·	·	·	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	·	x	1	x	x	·	·	·	·	·
La Fonda del Sol	1960	D	D	x	x	x	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	·
Hadfields Paint	1967	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	x	·	·	x	·	2	·	·	·	·	·	·	·
Priba	1973	·	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	·	·	·	x
Literatur in Köln	1974	·	D	x	·	·	·	·	·	·	·	x	1	·	·	·	·	·	·	·	·	0	x	·	·	·	·	·	·
MTV	1981	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	·	·	·	x
Columbus, Indiana	1983	·	·	·	·	·	·	·	·	·	·	·	0	x	·	·	x	x	x	·	·	4	·	x	·	·	·	·	x
Nickelodeon	1984	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	·	·	·	x
Nai	1994	·	D	x	x	·	·	·	·	·	·	x	2	·	·	·	x	·	·	x	·	2	·	x	·	·	·	·	x
Google Doodles	1998	·	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	x	·	·	x
EXPO 2000 Hannover	1999	D	S	x	x	·	·	·	·	·	·	x	2	·	·	·	·	·	·	·	·	0	·	x	x	·	·	?	x
Rhizome	2001	D	S	x	x	·	·	·	·	x	x	·	3	·	·	·	·	·	·	·	·	0	·	x	x	·	x	x	x
TV Asahi	2002	D	D	x	x	·	·	x	x	x	x	·	5	·	·	·	·	·	·	·	·	0	x	x	x	x	·	x	x
Brooklyn Museum	2004	D	S	x	·	·	·	·	·	·	·	x	1	·	·	·	x	x	·	x	·	3	·	x	·	·	·	·	x
Lesley Moore	2004	D	D	x	·	x	·	x	x	·	·	·	3	·	·	·	·	·	·	·	·	0	·	·	·	·	x	·	x
Seed Media Group	2005	D	S	x	x	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	x	x	·	x	x	x
Walker Art Center	2005	·	·	·	·	·	·	·	·	·	·	·	0	x	x	·	·	x	·	·	·	3	·	·	·	·	·	·	x
Evolving Logo *	2006	D	S	x	·	·	·	·	·	·	·	x	1	·	·	·	·	·	·	·	·	0	·	x	x	·	x	x	x
New York City	2006		D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	x	·	·	·	1	·	·	·	·	·	·	x
Casa da Música	2007	D	S	x	x	·	·	·	·	·	·	x	2	·	·	x	·	x	·	·	·	2	x	·	x	·	x	x	x
Get Up	2007	D	S	x	·	x	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	·	·	x	·	·
Lovebytes 2007	2007	·	D	·	·	·	·	·	·	·	·	x	1	x	·	·	·	·	·	·	x	2	·	x	x	·	·	·	x
New Museum	2007	·	D	x	x	·	x	·	·	·	·	·	2	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	x
IDTV	2008	·	D	·	·	·	x	·	·	·	·	·	1	x	x	·	·	x	·	x	·	4	·	·	x	·	·	·	x
Mobile Media Lab	2008	D	S	·	·	·	·	·	·	·	·	·	0	·	x	·	·	x	·	·	·	2	·	·	x	·	·	·	x
Museum of Arts and Design	2008	·	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	x
Swisscom	2008	D	S	x	·	·	·	·	·	x	·	x	2	·	·	·	·	·	·	x	·	1	·	x	x	·	·	x	x
Aol.	2009	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	x
Boolab	2009	·	D	·	x	·	·	·	·	·	·	·	1	·	·	·	x	·	x	·	·	2	x	x	·	·	·	·	x
Circus	2009	·	D	x	·	·	x	·	·	·	·	·	1	·	x	·	·	x	·	x	·	3	·	·	·	·	·	·	·
City of Melbourne	2009	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	·	·	·	x
COP15	2009	D	S	x	·	·	·	·	·	·	·	x	1	·	·	·	·	·	·	·	·	0	·	x	x	·	·	·	x
Decode	2009	·	D	x	x	·	·	·	·	·	·	x	2	·	·	·	·	·	·	·	·	0	·	·	x	·	x	·	x
Izabela Klemenska Hair Salon	2009	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	·
onedotzero	2009	·	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	x	·	x	x	x
Pantone Hotel	2009	D	S	x	x	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	x	·	·	·	·	·
Paramount	2009	·	S	·	·	·	·	·	·	·	·	·	0	·	·	·	·	x	·	x	·	2	·	·	·	·	·	·	·
Tess Management	2009	·	D	x	x	x	·	·	x	·	·	·	3	·	·	·	·	·	·	·	·	0	·	·	x	·	·	·	·
Design Academy Eindhoven	2010	S	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	·	x	·	x
Management for Design	2010	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	x	x	·	·	·	x
New Prevention Technologies	2010	D	S	x	x	x	·	·	·	·	x	·	3	·	·	·	·	x	·	·	·	1	·	·	·	x	·	·	·
Prima Vina Stiriae Slovenae	2010	·	S	·	·	·	·	·	·	·	·	·	0	·	·	x	·	·	·	·	·	1	x	·	·	x	·	·	·
Spain arts & culture	2010	D	S	x	x	·	x	·	·	·	·	·	2	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	x
Visit Nordkyn	2010	D	D	x	x	·	·	·	·	·	·	x	2	·	·	·	·	·	·	·	·	0	x	x	x	x	·	x	x
EDP	2011	D	S	·	·	·	x	·	·	·	·	·	1	·	x	·	·	·	·	·	·	1	·	x	·	·	·	·	x
FADU	2011	D	S	x	x	x	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	0	x	·	·	x	·	·	·
Geores	2011	D	S	x	x	·	·	·	·	x	·	·	2	·	·	·	x	·	·	x	·	2	?	·	·	x	·	·	x
House of Visual Culture	2011	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	x	·	x	x	x
Lovesac Alternative Furniture Co.	2011	D	S	x	·	·	x	·	·	·	·	·	1	x	·	·	·	·	·	·	·	1	·	·	·	·	·	·	x
MIT Media Lab	2011	D	S	x	x	·	·	·	·	·	·	x	2	·	·	·	·	·	·	·	·	0	·	x	x	·	x	·	x
Museum of Architecture and Design	2011	·	D	x	·	·	x	·	·	·	·	·	1	x	·	·	·	·	·	·	·	1	x	·	·	·	·	·	x
OCAD University	2011	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	x	·	·	x	x	·	x
OVG Real Estate	2011	·	S	·	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	·	x	1	·	x	·	·	·	·	x
São João Porto	2011	·	D	·	·	x	·	·	·	·	·	·	1	x	x	·	·	x	·	·	·	3	·	·	x	·	·	·	·
Talking Heads	2011	D	S	x	x	·	·	·	·	·	·	x	2	·	·	·	·	·	·	·	·	0	x	·	·	x	·	·	·
xwashere	2011	D	S	x	·	x	·	·	·	·	·	·	1	x	·	·	·	·	·	·	·	1	·	·	·	x	·	·	·
Axis of Culture in Katowice	2012	D	S	x	x	·	·	·	·	·	·	x	2	·	x	·	·	x	·	·	·	2	·	·	·	·	·	·	·
Catalan Wines	2012	·	S	·	·	x	·	·	·	·	·	·	1	x	x	x	·	·	·	·	·	3	x	·	·	x	·	·	·
Choco	2012	·	D	x	·	x	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	·
Crystalet	2012	D	S	x	x	·	·	·	·	·	·	x	2	·	·	x	x	·	·	x	·	3	x	x	?	x	·	·	x
CX	2012	·	D	x	x	·	x	·	·	·	·	·	2	·	·	·	·	·	·	·	·	0	·	·	·	·	·	·	x
Festival Caminhos Cinema Português	2012	·	D	·	·	·	·	·	·	·	·	·	0	·	x	·	·	x	x	x	·	4	x	·	·	·	·	·	·
Flux	2012	·	·	·	·	·	·	·	·	·	·	·	0	·	x	·	·	x	·	·	x	3	x	x	·	·	·	·	x
Jewish Museum & Tolerance Center	2012	·	S	·	·	·	·	·	·	·	·	·	0	·	·	x	·	·	·	·	·	1	x	·	·	·	·	·	·
Moscow Design Museum	2012	D	S	x	·	·	x	·	·	·	·	·	1	·	x	·	·	·	·	·	·	1	·	·	·	·	·	·	x
My Name is Films	2012	D	S	x	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	·	·	0	·	·	·	·	x	·	x
Schism	2012	D	S	·	·	·	x	·	·	·	·	·	1	·	·	x	·	·	·	·	·	1	·	·	·	·	·	·	x
Sofia Breathes	2012	·	D	·	·	x	·	·	·	·	·	·	1	·	·	·	·	x	·	·	·	1	·	·	·	·	·	·	·
The Floating Eye	2012	D	S	·	·	·	·	·	·	·	·	·	0	x	x	·	·	·	·	x	·	3	·	·	·	x	·	·	·
Dumbar Design College	2013	·	S	·	·	·	·	·	·	·	·	·	0	x	·	·	·	x	·	·	·	2	·	·	·	·	·	·	·
Gusto	2013	·	D	x	·	·	x	·	·	·	·	·	1	·	·	·	·	x	·	x	·	2	·	·	·	·	·	·	·
Jeonju International Film Festival	2013	D	S	x	x	·	·	·	·	·	·	x	2	·	x	·	·	x	·	·	·	2	·	x	?	·	·	·	x
KAKAO	2013	D	S	·	·	x	·	·	·	·	·	·	1	·	x	·	x	·	·	·	·	2	·	·	·	·	·	·	x
Kamnin	2013	D	S	x	·	·	·	·	·	x	·	x	2	·	·	·	x	·	·	x	·	2	·	x	?	·	·	·	x
Krakowskie Szkoly Artystyczne	2013	D	S	x	x	·	x	·	·	·	·	·	2	x	·	·	·	·	·	·	·	1	·	·	·	·	·	·	x
NAAA TAA	2013	S	·	·	·	·	·	·	·	·	·	·	0	·	·	·	x	·	·	·	·	1	x	x	x	·	·	·	x
Nezavisimost Insurance Company	2013	S	S	x	·	·	·	·	·	·	·	·	0	·	·	·	x	·	·	x	·	2	·	·	·	·	·	·	·
Optica *	2013	D	S	x	·	·	·	·	·	x	·	·	1	·	·	·	·	·	·	·	·	0	·	x	·	·	·	·	x
WOW	2013	·	S	·	·	·	·	·	·	·	·	·	0	x	·	x	·	·	·	·	·	2	·	·	·	·	·	·	·

Note: VIs whose entities names are followed by an asterisk are personal projects. Characters meaning: 'D' – Dynamic; 'S' – Static; 'x' – Yes; '?' – Maybe

Figure 9.



Screenshot of the web-based visualization tool, which can be accessed at cdv.dei.uc.pt/2018/dynamic-identities. A demo video of this visualization tool is also available at cdv.dei.uc.pt/2018/dynamic-identities/demo.mov.

mechanisms, and features. This approach enables the emergence of clusters of DVIs and the consequent revelation of similar DVIs in a particular aspect.

The visual properties of each node are set according to the properties of the corresponding DVI. The user can customise how each property or set of properties is visualised, e.g., positioning (graph), shape, or colour. The user can also explore a set of presets that automatically configure the visualization to reveal specific correlations. The index comprises all the properties of the DVIs and functions as filter and caption of the graph.

Analysis of the results

In this subsection, we analyse the results at two different levels: (i) we present the main questions raised during the application of the model to a set of DVIs and (ii) analyse the results of the application.

General analysis

During the application of the model, several questions were raised which were related to how the model should be used. In the following paragraphs, we address these questions and present our conclusions.

Scope of the variation mechanisms.

We aim to develop a model with clear distinction among VMs and features. However, such goal is difficult to achieve due to the subjectivity of the field. In some cases, the identification of the VMs is difficult due to complex combinations of different VMs and also because some outcomes can be achieved using different VMs.

Our analysis is based on our view of how the limit between the different VMs should be established. An example of this is the distinction between using *content variation* and using either *colour variation* or *shape transformation*. One may argue that since there is a change in content, the colour and shape also change. Such goes against the definitions of the VMs *colour variation* and *shape transformation* as these focus on the change of colour and shape, respectively, on the same graphic element. In the case of *content variation*, the focus is not a single element but the possibility of changing the content itself. In the DVI Design Academy Eindhoven, for example, despite the use of several colours, the variation focus is on the change of the content – *colour variation* and *shape transformation* are superseded by the *content variation*. This is different from what occurs, for example, in the case of the DVI Brooklyn museum: the mechanism used in the graphic mark is *shape transformation* instead of *content variation* as it is clearly the transformation of a single element – the blue shape around the 'B' letter.

Same variation mechanism in both sides.

In some cases, the variability that is exhibited by one of the elements of a VI system is extended to other elements. For this reason, when analysing the VMs used in one DVI, one should not only determine in which element it is being used, e.g. graphic mark, but also how it is being used. This way, a VM is marked on both sides (graphic mark and system) when there is a difference in the way it is used.

It is possible to identify three different situations: (i) the VM is firstly applied to the graphic mark and then extended to the system without changing the purpose (only marked on the graphic mark side of the proposed model), e.g. *content variation* in the VI for My Name is Films; (ii) the VM is applied to another element other than the graphic mark but is extended to it without changing the purpose (only marked on the system side), e.g. *combination* and *repetition* in the VI for Mobile Media Lab; and (iii) the VM is used in the graphic mark and in the system with different purposes (marked on both sides), e.g. *shape transformation* in the VI for Lovebytes 2007.

Application analysis

We now describe and discuss the results from the application of our model to a set of DVIs. Despite using a limited selection, this model can be used with other DVIs beyond the ones analysed in this paper (see subsection *Archive*). It also enables the assessment of the similarity degree between DVIs based on VMs and features, making it possible to categorise or group them. Regarding the conclusions drawn, one should not forget that they were extrapolated from this selection of DVIs.

Graphic mark.

By looking at Table 5, one can see, that most of the DVIs use the graphic mark to generate a changing look within the VI system and, in some cases, the graphic mark is the only element of the VI system that changes. Most DVIs have symbols (49/80), from which 46 are dynamic, and most have logotypes (75/80), from which only 27 are dynamic. Only 5 DVIs have both dynamic symbol and dynamic logotype; 12 DVIs have neither a dynamic symbol nor a dynamic logotype, from which only one is graphic mark focused.

Where variation mechanisms are used.

Looking at Table 5, one can see that 65 out of the 80 DVIs (81%) use one or more VMs in the graphic mark and 43 (54%) use one or more VMs in the system. However, only 28 DVIs (35%) use VMs simultaneously in the graphic mark and in the system. One can also verify that 37 DVIs (47%) exclusively vary their graphic mark and 15 (19%) exclusively vary their system.

The average number of used VMs is higher in the graphic mark (1.24) than in the system (1.05). However, by focusing on the DVIs that use at least one VM in the considered side, more VMs are combined in the system (1.95) than in the graphic mark (1.05).

There is a greater variation in terms of VMs used in the graphic mark than in the system. This can be confirmed by calculating the standard deviation of the percentages of DVIs that use each VM in the graphic mark and in the system: 13.7% and 6.6%, respectively.

Most used variation mechanisms.

Regarding which VMs are most used, 36 DVIs use *colour variation* and 35 use *content variation* (see *Table 6*). Focusing on the VMs used in the graphic mark, the most used is *content variation* (29/80) (see *Table 7*). In the case of the system, the most used VM is *repetition* (18) (see *Table 8*).

TABLE 6

Variation mechanisms	Variation mechanisms							
	colour var. (36)	combination (23)	content var. (35)	positioning (13)	repetition (21)	rotation (9)	scaling (17)	shape transf. (20)
colour var. (36)		12	11	6	11	5	8	11
combination (23)	12		5	2	13	1	5	3
content var. (35)	11	5		2	5	0	5	2
positioning (13)	6	2	2		4	5	8	4
repetition (21)	11	13	5	4		3	8	5
rotation (9)	5	1	0	5	3		6	2
scaling (17)	8	5	5	8	8	6		5
shape transf. (20)	11	3	2	4	5	2	5	

TABLE 7

Variation mechanisms (graphic mark)	Variation mechanisms (graphic mark)								
	colour var. (24)	combination (12)	content var. (29)	positioning (2)	repetition (3)	rotation (6)	scaling (3)	shape transf. (17)	*
colour var. (24)		4	4	1	2	3	3	10	3
combination (12)	4		0	1	2	0	1	0	7
content var. (29)	4	0		0	0	0	0	0	25
positioning (2)	1	1	0		2	1	1	0	0
repetition (3)	2	2	0	2		1	1	0	0
rotation (6)	3	0	0	1	1		2	2	1
scaling (3)	3	1	0	1	1	2		0	0
shape transf. (17)	10	0	0	0	0	2	0		5
*	3	7	25	0	0	1	0	5	

TABLE 8

Variation mechanisms (system)	Variation mechanisms (system)								
	colour var. (13)	combination (14)	content var. (7)	positioning (11)	repetition (18)	rotation (3)	scaling (14)	shape transf. (4)	*
colour var. (13)		5	2	1	5	1	2	1	4
combination (14)	5		1	1	9	1	4	1	2
content var. (7)	2	1		1	1	0	1	0	3
positioning (11)	1	1	1		2	2	7	0	1
repetition (18)	5	9	1	2		2	6	1	3
rotation (3)	1	1	0	2	2		1	0	0
scaling (14)	2	4	1	7	6	1		0	1
shape transf. (4)	1	1	0	0	1	0	0		2
*	4	2	3	1	3	0	1	2	

Note: The column and row with '*' show the number of DVIs that only use the identified variation mechanism.

Combinations of variation mechanisms.

In Figure 10, one can see DVIs positioned according to the VMs they use, forming different clusters. Concerning VMs used in the graphic mark (see Fig 10a), the most evident clusters are the ones composed of DVIs that only use *content variation* (25), DVIs that do not use any VM (15), and DVIs that use *colour variation* and shape transformation (10). In the system (see Fig 10b), the cluster that stands out contains DVIs that do not use any VM. When considering the VMs from both sides (see Fig 10c), only one cluster stands out and represents DVIs that use content variation in the graphic mark and no other VM on both sides (15). This information is also verified in tables 6, 7, and 8, in which all possible combinations of VMs are quantified.

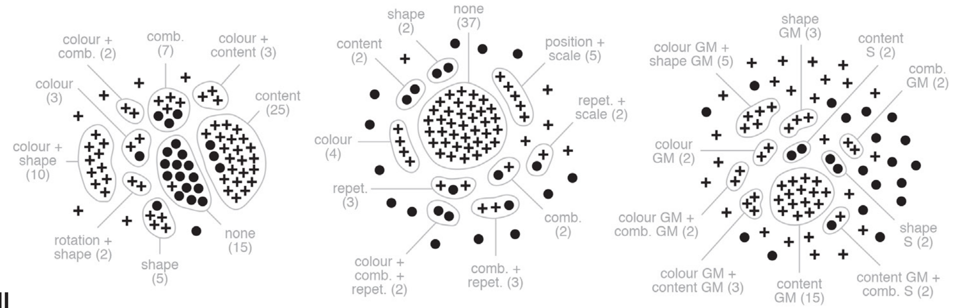


Figure 10.

DVI clusters. From left to right: DVIs positioned according to the VMs used in (a) graphic mark; (b) system; and (c) graphic mark and system. Each shape represents a DVI, wherein the crosses represent the ones that are graphic mark focused.

Based on Table 7, which considers the VMs in the graphic mark, the majority of the DVIs that use *shape transformation* also use *colour variation* (10/17). Table 8, which considers the VMs in the system, shows that most of the DVIs that use *combination* also use *repetition* (9/14) and that DVIs that use *positioning* also use *scaling* (7/11). Table 6, which considers the VMs in both sides, shows that: DVIs that use *rotation* also use *scaling* (6/9); DVIs that use the *repetition* also use *combination* (13/21), and vice-versa (13/23); and DVIs that use *positioning* also use *scaling* (8/13).

Identity focus VS variation mechanisms.

Looking at Table 5, one can see that most DVIs are focused on the graphic mark (57/80). These mostly use *content variation* (28) and *colour variation* (26), whereas DVIs that are not graphic mark focused mostly use *combination* (11), *repetition* (10) and *colour variation* (10).

One can see a strong correlation between where the focus of the DVI is and where the VMs are used. Almost all DVIs focused on the graphic mark (56/57) use one or more VMs in the graphic mark. Only some of the DVIs focused on the graphic mark (20/57) use one or more VMs in the system. All DVIs not focused on the graphic mark use at least one VM in the system (see Table 5) and the majority of the VMs are only used in the system side (no VMs exist in the graphic mark and when they exist, they are originated in the system and therefore are not marked in Table 5 on the graphic mark side).

Our position is that the focus is based on what gives recognisability to the identity system – the graphic mark or other element(s) of the system. In this sense, the aforementioned correlation indicates that the VMs help to develop the personality of the VI system and therefore influence its focus.

Identity focus VS features.

We can also observe some connections between focus and features. For instance, some features are only achieved by graphic mark focused DVIs – *participatory* and *reactive*. Also, while most graphic mark focused DVIs are *unlimited* (41/57), only half of the DVIs that are not graphic mark focused achieve this feature (12/23).

Variation mechanisms VS features.

The most frequent feature is *unlimited* (53), followed by *flexible* (27), *fluid* (25), *generated* (23), *participatory* (13), *informative* (13), and *reactive* (10) (see *Table 9*).

Variation mechanisms	Features: flexible (27)	fluid (25)	generated (23)	informative (13)	participatory (13)	reactive (10)	unlimited (53)
colour var. (36)	11	13	14	10	5	6	24
combination (23)	4	3	5	5	2	0	9
content var. (35)	15	3	6	5	6	3	26
positioning (13)	5	8	4	3	1	1	11
repetition (21)	4	5	7	2	2	2	11
rotation (9)	4	7	4	2	1	3	8
scaling (17)	4	7	6	5	1	3	9
shape transf. (20)	7	15	12	3	4	5	17

TABLE 9

Number of DVIs that use each combination of variation mechanism and feature

In Table 9, one can see the most used VMs for each feature: *Flexible* DVIs (27) mostly use *content variation* (15) and *colour variation* (11); *Fluid* DVIs (25) mostly use shape *transformation* (15) and *colour variation* (13); *Generated* DVIs (23) mostly use *colour variation* (14) and *shape transformation* (12); *Informative* DVIs (13) mostly use *colour variation* (10); *Participatory* DVIs (13) mostly use *content variation* (6); *Reactive* DVIs (10) mostly use *colour variation* (6) and *shape transformation* (5); *Unlimited* DVIs (53) mostly use *content variation* (26) and *colour variation* (24). These results help to understand which mechanisms are mostly used to achieve certain features and this way can aid designers in the development of new DVI systems.

When analysing which VMs lead to which features, we observe the following relations: 78% of the DVIs that use *rotation* are *fluid*; 75% of the ones that use *shape transformation* are *fluid*; 85% to 89% of the DVIs that use *positioning*, *rotation* or *shape transformation* are *unlimited*.

Features VS features.

It is possible to notice some correlations between different features (see *Table 10*). All *reactive* DVIs are *generated* and *unlimited*. This is due to the fact that reactivity requires variation to be related to external input, such is

normally achieved using computational means and typically results in an unlimited number of instances. Among the DVIs that are *fluid*, *generated* or *participatory*, almost all are *unlimited*. This is due to constant change, computational power and freedom of content, respectively. Most of the *generated* DVIs (15/23) and most of the *reactive* DVIs (7/10) are *fluid*. This is due to the exploration of visual variables, e.g. colour and shape, in a continuously using through computational means.

Features	Features: flexible (27)	fluid (25)	generated (23)	informative (13)	participatory (13)	reactive (10)	unlimited (53)
flexible (27)		8	7	10	5	5	19
fluid (25)	8		15	3	4	7	23
generated (23)	7	15		3	8	10	21
informative (13)	10	3	3		1	2	7
participatory (13)	5	4	8	1		6	12
reactive (10)	5	7	10	2	6		10
unlimited (53)	19	23	21	7	12	10	

TABLE 10

Number of DVIs that use each combination of features

Discussion

When analysing the evolution of the number of DVIs throughout the years, we can observe that DVIs have proliferated in the past decade. As already discussed, most of the DVIs are centred on the graphic mark. Despite that, it can be observed that the number of DVIs that (i) are not graphic mark focused and (ii) use VMs in their systems is increasing over time. This indicates that the design of DVIs is becoming less centred on the graphic mark and more attention is being given to the other elements of the VI system. In other words, the graphic mark, if one exists, has the same importance as any other element. The consistency of the VI system in such cases is no longer achieved by pure repetition of a single element (e.g. graphic mark) but by creating coherent visual patterns with enough flexibility to maintain recognition among many individual variations.

Regarding who is adopting DVIs, according to our case studies, the most common sectors are art and museums (15%), events (13.75%) and media (13.75%). This conclusion is aligned with previous research, e.g. (Brasel & Hagtvedt, 2016). Some reasons behind the adoption of DVIs may include: the representation of collections (e.g. House of Visual Culture), programmes (e.g. Casa da Música), products (e.g. Priba), sections (e.g. Talking Heads), people (e.g. MIT Media Lab), or places (e.g. City of Melbourne, xwashere); the change according to different environments (e.g. Visit Nordkyn); the display of dynamism (e.g. MTV), creativity (e.g. Lesley Moore), or evolution (e.g. Evolving Logo); the communication of messages (e.g. Google Doodles); and the participation of the audience (e.g. Get Up).

In response to this variety of reasons for adopting a DVI approach and the numerous possibilities in terms of variation, the proposed model can be seen as a guide in the development of a design solution. Aligned with the aforementioned reasons for adopting a DVI, the need of the client may be related to achieving features like *participatory* (giving a sense of proximity to the public), *flexible* (allowing an easy cross-media transfer of contents) or even Fluid (enabling a sense of constant change, suitable to video animation often used in new media). The model and collected date not only provides directions of how to achieve a given feature (i.e. which variation mechanisms are usually used) but also allows the identification of similar cases and enables analysis of competitor brands. This enables an easy assessment in terms of suitability of the variation mechanisms for the problem of the client as well as the possibility to discover other ways to address its specific needs. For example, if the client asks for a *flexible* DVI, based on the results previously presented, the VMs *content variation* and *colour variation* are adequate choices. Another example, for developing an *informative* DVI, *colour variation* is a potential option. Other examples can be found in Table 9.

In addition, through the analysis of the collected case studies, it is possible to identify combinations of variation mechanisms that were not observed. Despite the fact that each design solution should be tailor-made to satisfy the requirements of the client, finding novel ways of achieving dynamism can be a way to stumble upon a great solution.

In this study, we identify two main questions which should be answered when developing a DVI system. The first question is how to create dynamism – the focus of this survey and what our model aims to address. The second question, which we consider out of scope in the context of this survey, is related to why, and even whether, the VI needs to be dynamic.

Conclusion

This work provides two main contributions: (i) a comprehensive state-of-the-art on dynamic visual identities (DVIs) as well as an analysis of the related terminology and existing models, identifying their issues and fragilities; and (ii) a model for analysing the variation behaviour of DVIs. In addition, we applied our model to a vast set of DVIs and created a web visualization to help in the analysis of the obtained results.

The proposed model aims to reduce subjectivity in the analysis of DVIs by focusing on the graphic mechanisms used to achieve dynamism. Such focus aligns the model with design practice, making it suitable for DVI development and analysis. Advantages of the developed model include: (i) the distinction between mechanisms and features; (ii) an easy comparison between visual identities based on different aspects, e.g., variation mechanisms, leading to (iii) the detection of correlations between mechanisms and features as well as (iv) the identification of unexplored combinations; and (v) the possibility of creating objective categories.

We hope this work may serve as a useful resource for researchers involved in the analysis of DVIs as well as for designers in the development of new design solutions, providing them with guidelines for achieving the goals of the client.

There are enhancements from which the model can benefit and thus future work will focus on: (i) the expansion of the archive of DVIs by, for example, allowing other people to contribute with more case studies; and (ii) the further exploration of the web visualization to enable the extraction of more correlations and conclusions.

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