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**The language of graphics**

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# Glossary

This is a glossary of key terms that are proposed and used in this thesis. Terms in *italics* are cross-references to other entries in the glossary. The numbers in parentheses at the end of each entry refer to the (sub-) section of the thesis in which the concerned concept is discussed.

**arbitrary-conventional** (a *type of correspondence*): Type of correspondence is arbitrary-conventional if it seems to be based on pure convention. Note that in many cases the current users of the concerned representation may simply not be aware of the fact that the representation originated involving one of the other types of correspondence (3.1.5).

**background-inset display** (a *type of composite syntactic structure*): A background-inset display is a *nested syntactic structure* that consists of a *superimposition* of one or more *composite graphic objects* on a background object (2.5.4).

**basic syntactic structure**: See *syntactic structure*. A basic syntactic structure may be a *positioning* in a *meaningful space*, a *spatial clustering*, a *separation* by a *separator*, a *lineup*, a *linking* by a *connector*, a *containment* by a *container*, or a *superimposition* (2.5).

**cluster**: See *spatial clustering*.

**composite graphic object**: A composite graphic object is a *graphic object* that consists of a *graphic space*, a set of *graphic objects* that are contained in this graphic space, and a set of *graphic relations* in which these contained graphic objects are involved. A graphic object may be either a composite graphic object itself, or it may be an *elementary graphic object* (2.1 and 2.3).

**composite metric space** (a *type of meaningful space*): A composite metric space is a *metric space* that is constructed by combining two or more *metric axes* and/or *integral metric spaces*. In a *composite metric space*, a ratio between two spatial distances is only perceived as meaningful if these two distances are measured in certain directions (2.5.2). Compare with: *integral metric space*.

**composite syntactic structure**: A composite syntactic structure is a *syntactic structure* that is constructed from two or more *basic syntactic structures*, through *simultaneous combination* and/or *nesting* (2.5.4).

**connector** (a *syntactic role*): A connector is a *graphic object* in the shape of an arrow, band or line that is anchored to two other graphic objects (*nodes*), connecting them (2.5.1).

**container** (a *syntactic role*): A container is a *graphic object* that contains other graphic objects by visually surrounding them (2.5.1).

**containment by a container**: Containment is a basic *syntactic structure*, see *container* (2.5.1).

- decoration object** (an *informational role*): Decoration objects are *graphic objects* that serve neither as *information objects* nor as *reference objects*, and that could be erased without affecting the intended representation of information (data). They serve as embellishment, and may or may not be related to the context and theme of the represented information (3.3).
- distorted metric space** (a type of *meaningful space*): A distorted metric space is a meaningful space that can be thought of as a *metric space* that was printed on a 'rubber sheet' and then stretched non-homogeneously, preserving both order and approximate directions, but not preserving the ratios of spatial distances (2.5.2).
- elementary graphic object**: An elementary graphic object is a *graphic object* at the most detailed level of a syntactic decomposition. The level of detail of a syntactic decomposition will usually be chosen such that, with regard to semantics, an elementary graphic object will be a 'basic-level' meaningful object (often standing for some concept, entity, or occurrence) (2.3).
- graphic multiple** (a type of *composite syntactic structure*): A graphic multiple is a *multipanel display* in which the panels can be regarded as variations of a single representation. These variations have the same design and the same general *syntactic structure* (usually based on a *meaningful space*), but they display different data (2.5.4).
- graphic object**: *Graphic representations*, as well as their graphic constituents, are graphic objects. A graphic object may be an *elementary graphic object* or a *composite graphic object* (2.1 and 2.3).
- graphic relation**: A graphic relation may be either an *object-to-object relation* or an *object-to-space relation* (2.1).
- graphic representation**: A graphic representation is a visible artifact on a more or less flat surface, that was created in order to express information (1).
- graphic space**: Graphic space is the two-dimensional or (virtual) three-dimensional space that is displayed within a *graphic object* (2.2).
- graphic sub-object**: A graphic sub-object is a *graphic object* that is part of a *composite graphic object* (2.1 and 2.3).
- grid line** (a *syntactic role*): A grid line is a line-shaped *graphic object* that serves to mark a *meaningful space* (2.5.3).
- information object** (an *informational role*): Information objects are those *graphic objects* within a *graphic representation* that would have to be adjusted if the information (data) that one intends to represent would change (3.3). Compare with: *reference object* and *decoration object*.
- informational role**: The informational role of a *graphic object* is the role that it plays within a *graphic representation* with regard to the conveying of information. We distinguish three main informational roles: *information object*, *reference object*, or *decoration object* (3.3).

- integral metric space** (a type of *meaningful space*): An integral metric space is a two- or three-dimensional *metric space* in which all geometric properties of Euclidian space are subject to interpretation. This means that in an integral metric space, a ratio between two spatial distances is perceived as meaningful, regardless of the directions in which these two distances are measured (e.g. horizontally, vertically, diagonally, or in any direction in-between) (2.5.2). Compare with: *composite metric space*.
- label** (a *syntactic role*): A label is a *graphic object* that is anchored to another graphic object by *spatial clustering* (sometimes also involving *containment* or *superimposition*), or through *linking* by a *connector* (2.5.1).
- legend object** (an *informational role*): Legend objects are *graphic objects* that explain symbols and/or visual attributes that are used in a *graphic representation*. Most legend objects are *composite graphic objects*, structured as a table with one column displaying (some of) the used symbols and/or visual attributes, and another column displaying a verbal or numerical explanation of their meaning (3.3).
- line locator** (a *syntactic role*): A line locator is a *graphic object* that is anchored to a specific line in a *meaningful space* (2.5.3).
- lineup**: A lineup is a basic *syntactic structure* in which *graphic objects* are arranged in a 'string': Each object is perceived as having two neighboring objects, except for the two objects at either end of the lineup (2.5.1).
- linking**: Linking is a basic *syntactic structure* that involves *connectors* (2.5.1).
- literal** (a *type of correspondence*): Type of correspondence is literal if what is shown is based on similarity to the physical object or physical structure that is meant, or on similarity to a prototypical example of the kind of physical object that is meant (3.1.1).
- meaningful space**: The *graphic space* of a *composite graphic object* is a meaningful space if spatial positions in it are subject to interpretation regardless of whether or not there are graphic sub-objects present at those positions (2.5.2).
- metaphoric** (a *type of correspondence*): Type of correspondence is metaphoric if it is based on a (supposed) analogy between what is shown and what is meant. This may concern either a shared functional characteristic or a structural analogy (3.1.2).
- metonymic** (a *type of correspondence*): Type of correspondence is metonymic if it is based on a mental association due to the fact that there is (or used to be) a relationship of physical involvement between what is shown and what is meant. For example, what is shown 'is a part of' or 'is a possible result of' what is meant, or in some other way it 'plays a role in' what is meant (3.1.3).
- metric axis**: A metric axis is a spatial dimension along which the ratios of spatial distances are perceived as meaningful. A metric axis establishes a *metric space* (2.5.2).

- metric bar** (a *syntactic role*): A metric bar is a *graphic object* in a bar chart that is anchored to two points, extending between them: One end of a metric bar is anchored to the bar chart's base line (or base point in polar coordinates). The other end is anchored to a point at a distance from the base line that is measured along a *metric axis* (thereby determining the bar's length/height) (2.5.3).
- metric space** (a type of *meaningful space*): A metric space is a *graphic space* in which metric aspects of spatial positioning are subject to interpretation, such as the ratios of distances between *graphic objects* (e.g. 'the distance between A and B is twice the distance between B and C') (2.5.2).
- multipanel display** (a type of *composite syntactic structure*): A multipanel display is a *nested syntactic structure* in which two or more *composite graphic objects* are arranged as separate panels, next to each other (2.5.4).
- nested syntactic structure**: A nested syntactic structure is a *syntactic structure* that involves *nesting* (2.5.4)
- nesting** (a way of constructing *composite syntactic structures*): In a nesting of *syntactic structures*, a *composite graphic object* serves as a *single graphic object* in a syntactic structure at a 'higher level' (2.5.4).
- node** (a *syntactic role*): 'Node' is the term that we use for the *syntactic role* that is played by a *graphic object* that does not play any of the other syntactic roles that we have defined (e.g. *label, connector, separator*) (2.5.1).
- object-to-object relation**: An object-to-object relation is a *graphic relation* between *graphic objects* (2.5.1). Compare with: *object-to-space relation*.
- object-to-space relation**: An object-to-space relation is a *graphic relation* between a *graphic object* and one or more points in a *meaningful space* (2.5.1). Compare with: *object-to-object relation*.
- point locator** (a *syntactic role*): A point locator is a *graphic object* that is anchored to a specific point in a *meaningful space* (2.5.3).
- proportional division**: In a proportional division the total surface or volume of a *graphic object* is divided into sub-objects, and the relative sizes of these sub-objects are subject to interpretation (2.4).
- proportional repetition**: A proportional repetition is an evenly spaced collection of several identical copies of a *graphic object*, usually arranged in a *lineup*, in which the number of copies - and thus the size of the resulting composite object - expresses quantitative information (2.5.1).
- rebus-based** (a *type of correspondence*): Type of correspondence is rebus-based if it is based on the fact that (part of) the spoken word for what is shown sounds like (part of) the spoken word for what is meant (3.1.4)
- reference object** (an *informational role*): Reference objects are those *graphic objects* within a *graphic representation* that a) serve to enable the interpretation of *information objects*, and that b) would not necessarily have to be adjusted if the represented information (data) would change. Reference objects can be divided into *spatial reference objects* and *legend objects* (3.3).

- separation by a separator:** Separation is a basic *syntactic structure*, see *separator* (2.5.1).
- separator** (a *syntactic role*): A separator is a line- or band-shaped *graphic object* that is anchored between other graphic objects, thereby separating them (2.5.1).
- shared-axis multipanel** (a type of *composite syntactic structure*): A shared-axis multipanel is a *multipanel display* consisting of panels that share a *metric axis*, and that are arranged in a *lineup* - aligned with each other with regard to this shared metric axis (2.5.4).
- simultaneous combination** (a way of constructing *composite syntactic structures*): In a simultaneous combination of *basic syntactic structures*, a set of *graphic objects* simultaneously participates in two or more basic syntactic structures, at the same syntactic level of object decomposition (2.5.4). Compare with: *nesting*.
- spatial clustering:** Spatial clustering is a basic *syntactic structure* in which *graphic objects* are arranged into two or more groups through the use of within-group proximity versus between-group distance. The involved groups of graphic objects are referred to as 'clusters' (2.5.1).
- spatial reference object** (an *informational role*): Spatial reference objects are *reference objects* that mark a *meaningful space* (e.g. grid lines, axes and their annotations) (3.3).
- superimposition:** Superimposition is a basic *syntactic structure* that involves a foreground object and a background object. The foreground object is perceived as being 'in front of' the background object, visually occluding part of it (2.5.1).
- surface locator** (a *syntactic role*): A surface locator is a *graphic object* that is anchored to a specific surface in a *meaningful space* (2.5.3).
- syntactic role:** A syntactic role is a role that a *graphic object* may play within a *syntactic structure*. We distinguish these syntactic roles: *node*, *label*, *connector*, *separator*, *container*, *point locator*, *line locator*, *surface locator*, *volume locator*, *metric bar*, and *grid line* (2.5.1 and 2.5.3).
- syntactic structure:** The syntactic structure of a *composite graphic object* is a set of *graphic relations* in which its constituent *graphic objects* are involved. A graphic relation may be either an *object-to-space relation* or an *object-to-object relation*. A syntactic structure may be either a *basic syntactic structure* or a *composite syntactic structure*. The graphic objects that are involved in a syntactic structure may play different *syntactic roles* (2.5).
- type of correspondence:** Type of correspondence is the type of relationship between what is shown and what is meant. Type of correspondence may be *literal*, *metonymic*, *metaphoric*, *rebus-based*, or *arbitrary-conventional* (3.1).
- volume locator** (a *syntactic role*): A volume locator is a *graphic object* that is anchored to a specific volume in a *meaningful space* (2.5.3).











