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ON NOT DEFINING DRAWING

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This paper examines music notations using the comparative analysis of a taxonomical model, grounded in theories of practice from John Willats, and Nelson Goodman. In other classifications that include the robust Western staff notation, for an example, such drawings have been insufficiently explained, sometimes subsumed into categories of diagram, or at best thrown down as a kind of hub, vaguely associated with an unwieldy number of relations. In this paper, conclusive assessments will be made of the relationship between music notations and other drawing systems, in which the reader will see that they are hybrid representation systems, mapping to and from a conjunctive space-time of performance, with characteristics of all of writing, pictorial and denotative drawing.

ON NOT DEFINING DRAWING

The painter Stephen Farthing recently produced an admirably stoic working definition of drawing, as the translation of ‘multidimensional events that may or may not physically exist, into readable two dimensional matter’ (2011, p.2). This is a generalised definition in a context where expanding collections of information and representation of data sets from industrial, financial, medical, and communication technologies all have taken advantage of the efficiencies of computational systems for organisation and search. Our cognitive inclinations have certainly asserted themselves in the ways that we sort and search such systems, re-forming heterogeneous databases to a kind of legibility through graphical representations in the form of bitmap prosthetics that pan and zoom, or trees and webs – metaphorical tricks, grounded in physical knowledge. And while his definition discounts without disregarding material aspects of drawing, the limitation to two-dimensions in Farthing’s reduction might be an inessential result of familiar observations that ends up excluding quite a bit in potential (see the public drawings of Felice Varini, for a vexing example). For all that, his simplicity is useful in a context where questions of technique, distribution and pedagogy are complicated by computational systems. More stirring in its language, perhaps, are the art-historian Erika Naginski’s remarks on ‘the dynamic collision of hand and mind to which (drawing) continually bears witness’ (2000, p.79). This is a literary take compared to the other more pragmatic one, but it says something essentially similar: rather than any mere artefact or implementation, what is in (a) drawing is evidentiary, but also an interaction.

The task of making any definitive statement on drawing – something so thoroughly embedded in culture and what it means to be human through pictures, diagrams and writing – is a tricky proposition. In this paper I argue that a taxonomical approach circumvents the failure of words, allowing us to see drawing as a field: not some thing in need of definitive explanation, but engagements better determined than defined, and satisfactorily expressed only in admission of its abundance. We could begin the task of not defining drawing, then, simply by acknowledging the problems inherent in any summary portrait of that abundance: Drawing is a thinking practice, and definition is impossible, due to the unfinished nature of our perceptions in the inscription.

Supporting the perspective of a 21st century fine artist with an interest in the interrogation of conventions, I have reviewed literature from communities investigating its uses in creativity, pedagogy and communication, seeking to determine its roles in cognition, and as support for ideation as an extension. My classification model was motivated by a selection (not exhaustive, but representative) of others that examine practices of design drawing, diagrams, and the mongrel interests of the fine artist, interrogating them for dominant and useful themes. I reviewed research stressing social context, author function (is it informative or speculative?), and characteristic codes (is it digital or analog; is it indexical, iconic, symbolic?). I read reports of computational and A.I. inspired research, and design-

related research into questions of production and consumption, supplemented by the experiential knowledge and reflections of the fine-art drawing practitioner working, so to speak, in intersections. In that spirit, the ontology inclined towards structural aspects – how we organise for legibility, rather than functional or social aspects. This bias reflects the expectation that realising the abundance of drawing will come by taking seriously the implications of our enormously long history of engagement with its practices, foregrounding cognitive values, rather than some aspect of artefactual status. Minimising cultural contingencies has incidentally had the heartening effect of bringing together Lascaux and the virtual studio as sites in which we draw, rather than conceiving their differences in terms of rupture.

More specifically, in previous classifications where the common Western staff notation is included (hereafter referred to as the CMN), familiar to composers and students of music for nearly a millennium, that system is insufficiently explicated, subsumed into categories of diagram, or at best thrown down as a kind of hub, and vaguely associated with an unwieldy number of relations, as in Farthings' *"Plan de dessin"* (2006). The objectives of my model, differentiating it from other taxonomies, were:

- a) A closer inspection of music notations, *qua* drawing, to show its relationships to other drawing systems.
- b) To decentralise specific modes in favour of a multi-disciplinary view appropriate to the persistence of its subject as a strategic, executive practice rooted farther back in our history than we can clearly see, and bearing fruit across multiple domains of knowledge.

Description and depiction

Between the extremes of pure mathematical theory and life-size working models lie abstract and concrete words, diagrams, maps, drawings, pictures, photographs, sculptures, film and so on (Fish and Scrivener, 1990, p.118).

Nelson Goodman's notation theory (1976) and John Willats' analytics (1997) were identified as key points of reference in this project. Goodman's work is an essential starting point for a range of disciplines concerned with symbolic communication, even for those that diverge from its conclusions. Under his rubric, an articulate notation scheme must support consistent, repeatable interpretation and performance, and he offers the CMN as our flawed, pragmatic best. I will not give a full account of the philosopher's notation theory, but as an exercise in understanding his essential distinction between "dense" and "articulate" systems, Goodman asks us to consider two primarily linear images: an electrocardiogram, and a Hokusai drawing of Mount Fujiyama (1976, p.229). While specific lines in each image may resemble each other, tracking across surfaces, they are deployed

in schemes with different objectives, and thus stand for different motivations. What matters in the diagrammatic line is the path it traces through its data field. Contingencies such as line weight or color are irrelevant: the image is a readout. To change qualities of its appearance would not affect its meaning. In contrast, in Hokusai none of these contingencies are irrelevant, all are at play. A pictorial representation is syntactically and semantically dense. Any mark in its field may be freely interpreted in significance, conceivably endless in routes of reference, and therefore, in Goodman's terminology, replete.

Thus in 20th century graphical music notations, such as those in John Cage's seminal book "Notations" (1969), stable readings as performative design are simply impossible. This is not to say that they cannot function as scores, merely that there are degrees between poles of articulation, and those degrees have real effects on legibility. It is because of its simple graphic conventions and visual geometry that the CMN has persisted, even in a music culture which accepts the noise, silence, and the indeterminacy of contemporary compositional practices.

Goodman lays out his notation theory as an effective division into branches of pictures, notations, and text. But however useful, once such categorisations are proposed the task of distinguishing between examples proves problematic. There is the habitual description-depiction dichotomy, of course, but in the task of making an adequate classification scheme for the leaky abundance of drawing, I argue they are too dichotomous to be useful. Any of us who have seriously engaged with drawings understands they are prodigal things, read and misread, broken down in consumption, which Deanna Petherbridge deems a necessary and useful condition (2010, p.13). Therefore, I carry forward an argument in Willats for a binary organisation into the Drawing and Denotation systems.

Keeping his focus on the page, Willats gives us an artefactually oriented model, and a stronger footing for classification because of the implications of necessity tied to systems of practice. Briefly, we use the Drawing systems to generate view-centred representations, 'putting things where they go, (mapping) spatial relations in the scene into corresponding relations in the picture' (1997, p.2). In contrast, the Denotation systems correlate between perceived systemic relations and the drawing. As opposed to the sketch practice, where marks coalesce and break, inference is constrained in denotative drawings by analytical and informative motivations (1997, p.4). The author notes their underlying geometry as 'based on the most elementary and general types of spatial properties, which include relations like touching, separation, spatial order, and enclosure' (1997, p.13). The differences between pictures and diagrams (or space and time), are thereby seen to be based on distinct marking-up approaches, accounting for questions of style as something other than mere socially novel praxes.

Drawing taxonomy

If worlds are as much made as found, so also knowing is as much remaking as reporting (Goodman, 1975, p.72).

Timothy Ingold writes that while a drawn line may work to circumscribe some shape, its tracery primarily represents the 'movement of becoming' (2010, p.18). In related terms, knowledge-representation diagrams target difference and emergence (Pope, 1986), also generally the subject of graphic-geometrical discourses. Stephen Pinker (in Lehrdal, 2003, p.271) considers "entity and relation" as central conceptual metaphors in verbal languages, also conspicuous in the vital impurity of the sketch – the very embodiment of Ingold's movement of becoming, and therefore embedded in the socially charged engagements of life-drawing, where we reach across studio spaces to touch a comrade with a stick of dirt. And we can *listen* to them, the musicologist Lehrdal suggests (2003), in the symbolic language of music, reminding us that geometrical proofs and the tally-sheet of a music notation are both methods of understanding transformation and performance.

Taxonomies of graphics and drawing have thus understandably tended towards domain-specificity. Lohse (et al, 1991), for example, is a widely cited paper describing five types of technical diagrams (tables, maps, diagrams, networks, icons) arrived at through user group studies, not the progressive dialectics of Schenk's (2007) or Lawson's (1994) studies of graphical interactions between designer, team, and client, but efficacy assessments by users, at the point of consumption. And much of the recent literature on design-drawing converges on its ideational benefits as dialogues with materials, experience, and objective, in a more or less targeted search. In this, Tversky writes that drawing is 'a cognitive tool developed to facilitate information processing... reflecting conceptualisations, not perceptions' (1999, p.1). In 1735, for instance, the mathematician Leonard Euler resolved the problem of whether a route could be plotted crossing each of the town of Königsberg's seven bridges only once. His (negative) solution demonstrated the simplest of mark-making strategies as a thinking tool, and on the entailments of Euler's achievement, the graphics theorist Edward R. Tufte wrote: 'Often the most effective way to describe, explore and summarise a set of numbers – even a very large set – is to look at pictures of those numbers' (2001, p.9).

Goodman further argues that the robustness of symbolic languages is related to the efficacy of its expressions in task fulfillment; in the title of an early chapter in Tufte's influential volume on data graphics ("Graphical excellence," 2001, pp.13-52), it is clear the author's use of "excellence" conforms to Goodman's efficacy. Indeed, the five principles of Tufte's data graphics theory are entirely based on economy, and as printed, they also beautifully express the very theory they describe (2001, p.105).

Above all else show the data.

Maximise the data-ink ratio.

Erase non-data ink.

Erase redundant data ink.

Revise and edit.

In the Königsberg bridges problem, which manages both largeness and smallness of scales, Euler developed a schematic, metonymic restructuring of a logical problem, for fruitful application beyond the merely theoretical. He did not actually cross the bridges, but used aspects of their relations to resolve questions of connectivity. The simplest of denotative drawings in Willats' analysis, such an external representation is itself a classification exercise, a paring away of the intractable that supports Goodman's perception that notation and digitality are kin.

Metric drawing

Billions of galaxies are never bigger, when they are counted, than nanometer-sized chromosomes; international trade is never much bigger than mesons... (Latour, 1986, p.20).

My reading of Goodman and Willats suggests a third class of drawing in addition to Projection and Topology, which will be called Metric, encompassing relational diagrams and systematic notations with time-factored and -factoring activity spaces: notations such as the CMN and the Laban movement notation.

As a practice of thinking over external representations, the poet Paul Valéry suggests that the writer's work is not a mere application of words to thoughts, but a synthetic symbolic tuning, in which there can be no optimal meaning dredged from a text (Tamplin, 1976, p.812). This principle also applies to the re-actions of the reader, diving into language, as Michel Serres has written, 'as if lost,' and then drawing through form and meaning, presumably to find some surface (in Scheher [tr.], 1983, p.53). It is a process comparable to views of translation, or indeed the work of the sketch, as dialogical work: an operation between languages, but also within a language, or a language-user.

Like Latour's mediated scale shift in the excerpt above from one impossibility to another, acts of translation allow us to span the "gap between a hypothetical perfect language and

the concreteness of a living language” (Ricoeur, in Kearney, 2007, p.152). And as Latour suggests, this thinking over the representation can equalise discrepancies, or bridge a vague notion to the tangibility of performance, scaling incomprehensibilities to the handfals and footfalls of our limited mental spaces.

In reading an inscription, we draw on contextual knowledge and the presence of perceptible attributes relating to distribution, regularity, and detail, and decide how to approach the thing – say, a tree; then we diagnose/attribute/extract provisional meanings. We might recover the inscription’s character in terms of a tree-picture (with some aspect of resemblance to the organism, a modal representation, with attributes specified in the display), or a tree-diagram (emphasising logical relations, amodal representations of connectivity and sequence), or as an arbitrary symbolic conveyance for the tree-concept (Peirce, 1942, p.114). The nature of our abilities to make such decisions cannot be examined in detail here, but in a taxonomical context, putting aside the affordances and unruly potencies in the reading game, I argue with Willats that we ground our search for salience in the inscription in its construction.

In drawing, of course, production and potential are only separable in theory. In the practice, the representational, communicative, and instrumental roles go on together. The creative underspecification of sketching is an example of such a unified structural-functional enterprise. While it may be called an “unstructured” approach, this is wrong: the sketch is a search through structuring. It is as much building as finding.

Space and time inscriptions

The very idea (of Algebra) is that it presents formulae which can be manipulated, and that by observing the effects of such manipulation we find properties not to be otherwise discerned’ (Peirce, 1885, p.182)

As a preparatory and executive operation, we draw: sketching, depicting, describing, mapping, showing, or saying. The markings supporting all of these, as practices, are more or less projective or denotative, in Willats’ or Euler’s terms, emphasising attributes or relations. Informed by the disposition of this taxonomy, an additional class of Metric Drawing is proposed: relational diagrams, systems of systems, each species of which uses some admixture of diagrammatic reasoning, iconicity, and the quasi-pictorial nature of character-strings (Elkins, 1999, pp.135-137) in order to map a space of time.

Again, Willats defines projective drawing as the mapping of ‘spatial relations in the scene into corresponding relations in the picture,’ and denotational drawing as the mapping of ‘scene primitives onto corresponding picture primitives’ (Willats, 1997, pp.2-4). But drawings like the CMN are oriented both into and out of the frame of the inscription, with

both an embedded and an external key. Such notations address explicitly temporal events, factoring between axes as a dynamic system, and generating a readout. Thus they are sufficiently differentiated from the parsimonious diagrams of Euler, the way-finding of maps, the ambiguities of text or underspecified drawing systems – not because these inscriptive practices are not in some ways temporal, but because time is not a character, so to speak, in their schemes.

All things are both spatial and temporal, in the sense that W. J. T. Mitchell indicates (1986, p.103), but in making a tree inscription we do not target temporal dimensions of the tree, except as interpretive content, or perhaps as time-factored sequences in diagram. Even Duchamp's strangely lucid "Nude Descending a Staircase" (1912) can only suggest through inscribed metaphors of fanning lines, tonal transitions, repetition, and diagrammatic directions of across and down. But metric notations, factoring movement, have additional concrete instructional motivations, and thus have a compositional, future-subjunctive tense (see Petherbridge, in Garner [ed.], 2008, p.37). They do not simply map from scene or sequence to surface, but work in a conjunctive dimension of performance: they are space-time notations. This is not the tracing of semblance or distribution, as in our other tree-inscriptions, but of reaching for communicable correspondences between differently orienting experiences.

In order to speak across perceptual modes, Forceville (in Gibbs [ed.], 2008, pp.462-482) suggests that we need engagements between (at least) two sign systems. As Latour has suggested, such engagements are made, the in-betweens bridged, translations cobbled together, through systematising notations which regulate the cognitive tool of drawing. Goodman, of course, predicates his notation theory on community obligations achieved through increasing articulation, attenuating noise to achieve signal. The CMN permits us to map pulses onto picture primitives, onto the page, then away again, remade into music. Similarly, the Labanotation encourages calculations of sinew, breath, and reveries on those onto the page, rendering leftward motions of the hand as characters for computation in both virtual and actual spaces of activity.

Tufte discusses what he calls narrative graphics of space and time, and relational graphics as methods to plot, present, and understand complex multi-dimensional data. Tufte suggests their benefit is that 'any variable quantity could be placed in relationship to any other variable quantity, measured for the same units of observation' (2001, p.46). He in fact refers to relational graphics as the "greatest" of all graphics because of this insight generating utility, which permits possible causal relationships to be grounded in a present of plotted variables, allowing us see the rate of evaporation of water relative to some objective schema, or the relationship between thermal conductivity and temperature in copper, or to compare employment and inflation, or even to calculate expressions of fear and rage as social behaviours.

No thing can actually be reduced to number or mere order, suggests Serres, except as input into a systematic operation, in some process of translation. The productive, inscribed work of the composer or the choreographer is never accountable as a merely statistical operation, but their graphic inscriptions take advantage of the same aspects of marking up that the generalisations of the Euclidean space of the page offers the geometer. 'The advantage gained in utilizing notational systems is clear,' writes James Blachowitz, 'we can manipulate them with greater accuracy and efficiency than analog models would allow; that is, we can calculate with them' (1997, p.13). The pulses of music are not things that can be explicitly pictured or even distributions that can be denoted. Thus, such a representational complex cannot simply label or concatenate, it must behave like a control interface – a surface of exchange between experience, sign-system, and user. Like Valéry's translator-poet, we must be enabled to constitute searches for form.

A Metric drawing is therefore a control interface; not a mere mapping to the page, as in projective or topological drawings, but a blending space with multimodal objectives, always about passage through a conjunctive space of time. Metric drawings allow us to hold the moon in hand, or mesons, or the pulses of the body, finally to construct bridges and arguments from their evanescence. And while we may never adequately define music, or grasp the entirety of the arguments, we may nonetheless draw them out, to grasp something more of ourselves.

But systematic notations are flawed. They work (we work them), but in their displacements from the things which they circle, they are frequently deemed even by users to have failed in their appointed tasks. They nonetheless exemplify drawing as a mechanism of creativity with which we can build bridges between symbolic languages.

In aid of developing the idea of a Metric classifier in the taxonomy, I adopted the four measurement scales – nominal, ordinal, interval, and ratio – defined by S.S. Stevens in pursuit of an answer to the question of whether it is possible to measure human sensation (1946). Measurement can be defined as a rule-based assignment of numbers to objects or events (Marradi, 1990), and in the broader sense of applying symbolic characters to real things as proxies, this is itself a practice of discrimination and classification, where perceived correspondences between objects and counting systems are determined, resulting in representations which become plastic in Peirce's sense.

In this adoption, we concede that the CMN, as a crucial exemplar species, addresses inherently imprecise contexts which are likely not cleanly measureable (an unsatisfying response to Stevens' motivating question). In drawing, a mark made is a multiplicity. Through marking we are made aware of the surface, and the ripples set in motion between the two, in the act. In any music notation, each mark has a correspondence relationship to some musical structure, giving up a measure of its instability in the visual domain while taking on some aspect of the problems of auditory representation. And while users of the

staff notation clearly seek to quiet the oscillations, experimentally inclined composers such as Cage depend upon the ontological instability of marks, seeking to orchestrate rather than distil the rippling: in loosening constraints, such composers supply menus, rather than proscriptions.

While music notations have functions as documents of events and processes, their real importance – what a score is for – is to delineate a ‘relationship to the future’ (Hanoch-Roe, 1997, p.146). They are drawings of spatiotemporal events acting as both input and readout mechanisms, directing our attention to future action. In their activity spaces, every mark is a character, every character has a behaviour, and their referents – those things being scored – are rendered at once static and dynamic, both description and proposition. They are algorithmic, intervallic environments in which we represent transformations, contiguities or angles in projection, forces and dynamics, and distributions between the space of audition and the space of vision, with the value-added capability of being played-back. In the play-back and -forward, quality and quantity are conflated, and we get a view beyond mere representation, towards production, invention and instruction.

Finally, music notations are environments in which drawing, reading and writing rub up against each other, and from the friction we are enabled to compose our thoughts; failure, bad ciphering, and creative accounting are possible, but also the construction of something beautiful. Similarly, in navigating immensely complex calculation sets for the culture of dance, the Labanotation – a factoring of bodily action – seeks to plot entities and relations by segmenting the dancer and aspect-characters of her movements into a vertical timeline, exploring isomorphic relations between phenomenal experience and organising marks. Marrying Willats to Goodman and Cage, the move from schema to convention in drawing permits expression, analysis, and annotation, permitting users to push the envelope of the domain of the notation: to score impossibilities. Such systems are not simply tools for doing a job, therefore, but mechanisms for determining how the job can be done.

The mechanism of the music notation treats gestures of sound-production as cyphers, but in the paring away, a ‘hallmark of abstract thought’ (Blachowicz, 1997, p.62), Metric drawings facilitate the making of observation into utterance. Those utterances may be garbled by imprecise or incorrect readings (which might of course be a motivation, as in many 20th century graphic notations), but they are nonetheless time-machines which exploit drawing’s synthetic cognitive advantages to a productive, rather than merely reactive engagement.

The metric-inscriptive act of a music notation transports the primary space of audition to the secondary space of marking, encoding for further passage. In its articulation it becomes a control interface between experience, sign system, and user, allowing both views and manipulations on the sum and substance of its art – in all cases, space and

time. Thus it is that in drawing we find our best opportunity to accomplish the measurement of sensation that Stevens would have us consider.

The geometry of inscriptions

...the circle of the proof is drawn, not imagined to be drawn... Thus, the action of the proof is literal, and the object of the proof must be the diagram itself, for it is only in the diagram that the acts of construction literally can be said to have taken place (Latour, citing Netz, 2008, p. 455).

In a metric classification we are extending geometric analogies derived from Willats, but also a more generic view described by Latour, who notes the advantages of working over inscriptions, that in their two-dimensions we ‘merge (propositions) with geometry... (which) result is that we can work on paper with rulers and numbers, but still manipulate three-dimensional objects “out there”’ (citing Ivins, in 1986, p.20). In these terms, we have noted elsewhere that both pictorialism and the written word in the West have been theorised to be derivative of our social compulsions to count and to document that counting (Griffin, 2011, p.80). Denise Schmandt-Besserat has persuasively traced the evolution of systematised marking through artefactual tallies ‘developed to keep track of property, beginning with a simple one-mark one-piece of property relation, developing into numerals as tallies became cumbersome for large sums and calculations’ (in Tversky, 2001), resulting in the numeracy which has allowed us to use numbers as something other than mere tokens. The logic of the social inscription, James Elkins has written in response, becomes an ‘articulated continuum of signs so that (every marked surface) will have a measure of pictoriality and of writing’ (1998, p158).

Music and music notations are both inscriptions, but while we sing the one – conversing with singing and song – with the other we orchestrate, nudge, or diminish, from a place of thought. Standing for silence, paper is a material surface on which we work, but as we seek to fold, crumple, etch or shape it, through the mediating influence of articulate, metric notations, the paper becomes a space of time. They are hybrid representational systems, in Recanati’s sense (2007, p.511), driven by the cognitive values of marking-up. They are mechanisms grounded on the entity-relation metaphor at play in all drawings, fashioning action and instruction, and applicable to anger, music, or leftward motions of the hand. Responding to a rhetorical question from John Cage about the relations between paper and music, then, I believe that music notations prove to be kind of calculus of the body, a reckoning of future and past, through a present of plotted variables.

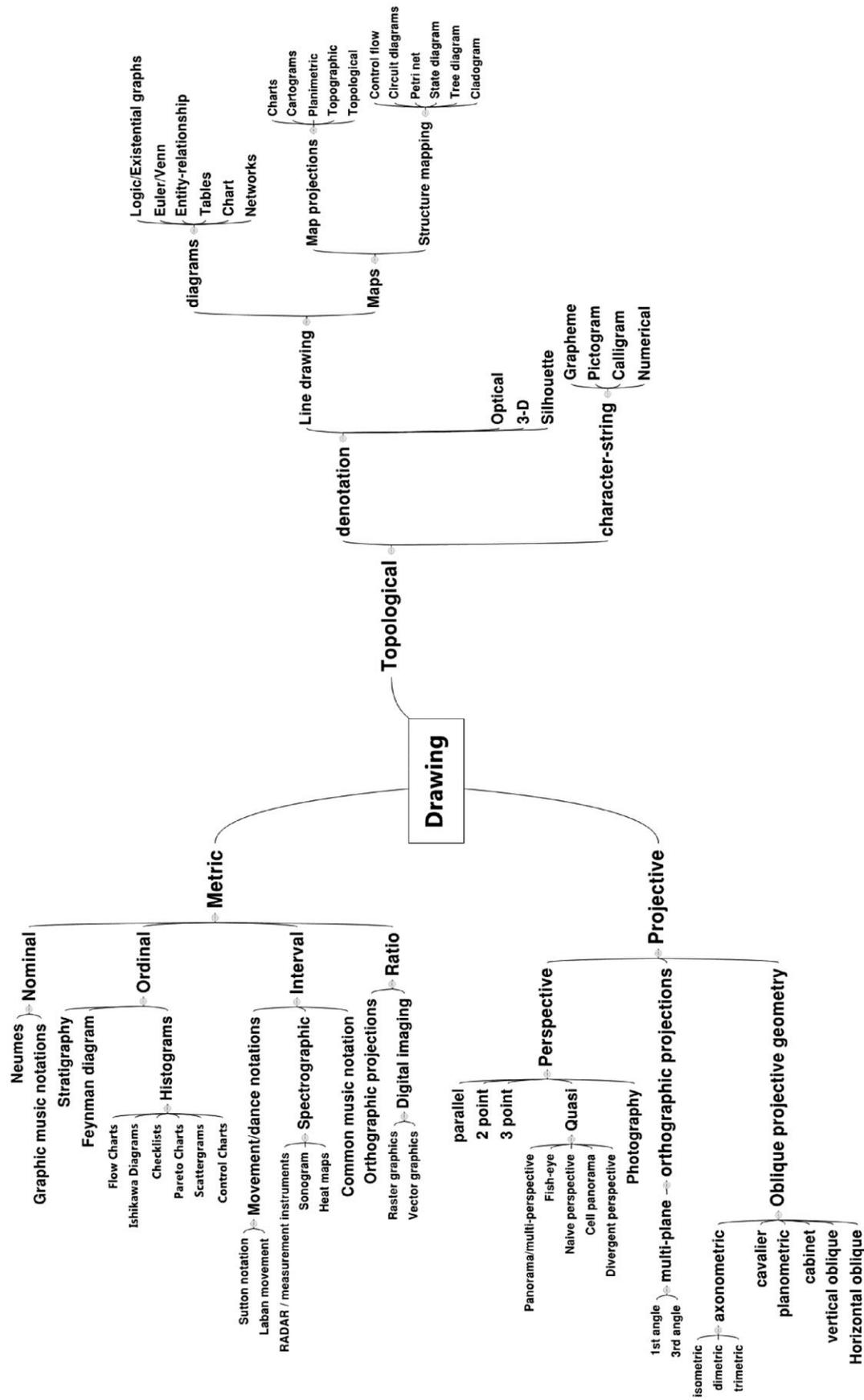


FIG.1: THE TAXONOMY: BUILDING ON WILLATS' BINARY VIEW, AND GOODMAN'S NOTATION THEORY, THREE CLASSES OF DRAWING PRACTICE ARE IDENTIFIED: THE TOPOLOGICAL, AND PROJECTIVE (WILLATS, 1997), AND THE METRIC. THE TOPOLOGICAL AND PROJECTIVE CLASSES BRANCH INTO ORDERS THAT COMPLY WITH WILLATS' USEFUL MODEL, WHILE THE METRIC CLASS BRANCHES INTO FOUR ORDERS, ORGANISING BASED ON S. S. STEVENS' (1947) NOMINAL, ORDINAL, INTERVAL AND RATIO MEASUREMENT SCALES (GRIFFIN, 2011).

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