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## The Pedagogies of Morphology and Gamification; Linking Gamification with Spatial Concepts

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### Abstract

*Configurative and morphological studies harness indicators to support conceptual and spatial frameworks specific to formal models of cities. However, the presence of new indicators, the scale of territories, and morphological methods are not only revising the praxis of configurative approaches; they collectively impact how and in what way the knowledge transfer occurs within educational settings. This paper explains how the contextual setting of the Greater Bay Area (GBA) as an urban agglomeration (UA) shifts the morphological framework in both its analytic tools and in its design premise. The paper covers the crossover to gamification (gameboarding) as a 'design and test' methodology providing a step-by-step account of rapid and succinct gameboarding phases for morphological studies. With close to 17 speculative models and three years of a collaborative studio, conclusions are drawn on the value of hybridizing morphological education with gamification, challenging uniform planning practices for future development within complex ecosystems.*

**Keyword:** Morphology pedagogies, data, spatial frameworks, gamification, gameboarding.

### Situating New Opportunities

There is an unquestionable link between the analytic tools deployed and individual morphological schools of thought. The approach of how to study, teach and transfer methods that relate to the formal condition of the built landscape has in each scholastic setting led to diverse possibilities of configurative studies. Between the primary morphological approaches — the Italian, French and English as well as the derivative methods of configurative analysis (Space Syntax, the Delft method, Swichenstad, Spacematrix) — what has stood central has been the use of indicators, elements and their relationships to one another in support of conceptual and spatial frameworks that explicate formal models of cities.

However, the presence of new indicators and methods are not only revising the praxis of configurative approaches; they collectively impact how and in what way knowledge transfer occurs within educational settings. The inclusion of new or other data sets, for example, geospatial information and remote sensing, environmental indicators (Morgani et al., 2017), big data (Crooks, 2016), performative indexes (Chokhachian, 2020) and metrics on volume (Bruyns, 2020), are collectively allowing for the continuing evolution of conceptual frameworks.

This paper explicates a new education framework, where pedagogical practices are embracing gamification principles in the teaching of morphological design. First, using a collaborative master's curricula spanning three years (2019 – 2021), this paper explains how the contextual setting of the Greater Bay Area (GBA) as urban agglomeration (UA) shifts the morphological framework in both its analytic tools and in its design premise. Secondly, the crossover to gamification (gameboarding) is discussed as a 'design and test' methodology to further develop 'territorial types of difference' as embedded situations to urban agglomerations. Third, the discussion provides a step-by-step account of rapid and succinct gameboarding phases, outlining the specific phases for designating new morphological propositions specific to the GBA. With evidence of close to 17 regional models, conclusions are drawn on the value of hybridizing morphological education with gamification, challenging uniform planning practices for future development within complex ecosystems.

### **Different Settings, New Testing Models and New Education Practices**

New data and setting types present the morphology curricula with new challenges. **First**, educational frameworks redirect attention away from partisan views that prioritize either zoning, street layout, building types and scale, associated with a single city. In its present state, the morphing of the 'single city' into an aggregation of urban settings complexifies the nature of form and spatial structure. Surpassing the umbrella nomenclatures of Gottmann's (1957) megalopolis and Geddes' (1968) conurbation of regions and territories, what we encounter presently in the poly-nuclear and poly-centric paradigms, is the captioning of urban agglomerations (UA) under descriptive terms as the Extended Metropolitan Region (EMR), metropolitan area (MA), City-Region, standard metropolitan area (SMA) or mega-urban region (Jones, 2008). Each instance highlights new setting types fabricated from a wide spectrum of information and data systems as well as a social and material process. With the first characterization of urban agglomerations in the New York Metropolitan Area (NY, New Jersey, Long Island, Philadelphia, Baltimore, Washington), the Greater Los Angeles Metropolitan Area (LA, San Fernando and San Bernadino Valleys, Long Beach, San Diego) or in Japan, the Tokyo Bay region (Tokyo, Kawasaki, Chiba, Yokohama), UA's are currently a global fact. The Ruhrgebiet, the greater London region and the Randstad have restructured the spatial setting of Europe, with other and new emerging mega-agglomerations characterizing Manila, Jakarta, Delhi, Dhaka, Mumbai and Lagos. Added to this, UA's similarly present challenges. Spatial agglomerations distort local regions. The loss of local culture and systems in the fusion with the global economy often leads to disenfranchisement, uneven development, and peripheral informalities (Kaminer et al., 2011). As an example, Shenzhen's Special Economic Zone (SEZ), a highly successful technology and innovation hub (Alibaba, Tencent, and others), agglomerates city and hinterlands (Shenzhen-Guangzhou). Harnessing urban agglomeration as a conceptual driver in morphological studies may offer new opportunities as to how the formal condition of the built environment can respond to regional development through contemplation of regional competitiveness, economies of scale, global integration, logistics, connectedness, cross-border (Hasdell, 2016), and higher-level planning strategies.

**Secondly**, the development of mega agglomerations requires new practices of testing and prototyping urban morphology. Herein our position argues that the teaching of these possibilities can draw on the work of gamification and in what we call 'spatial game boarding' to develop futures of spatial difference. The evident disjointedness between gaming and regional testing has not only exposed ways of developing tactical concepts related to player-opponent or strategies and decisions; they concomitantly exposed the principles of 'in-game' versus 'real-world behaviour' (Sparrow et al., 2015; Fox, 2016; Haywood, 1954; Crogan, 2011). For the purposes here, Thom, Millen & DiMicco's (2012) definition of gamification, as the application of playing systems in non-gaming settings with the intention to establish "playfulness" for the sake of enjoyment or desirability, links gamification to space and, ultimately regional planning. The broader debate on gamification and tactical concepts can be traced to O. Haywood's (1954) text, drawing from actual World War II decisions tactics to outline how sequential strategies are 'played out' to assess the positions of a commander and his enemy; in terms of what either is able to do against what the other is 'going to do'. More profound concepts of actions as testing phases can be surmised through; (a) situations and actions, (b) opposing courses of actions and (c) available courses of actions. In combination, these three conditions become critical to tactical thinking; how to engage and at what cost. In this, the use of maps adds to the spatial reality, how each tactical step plays an integral part in conveying tactical intentions and their (counter)actions in space. Haywood's argument exposes the dialectics of gaming as tactics. On the one side, one finds the relationship in how strategies are deployed in-game mechanics representing life-like scenarios, while on the other, the creation of games meant to model strategy allows humans to play out their decision processes as well as their outcomes. The creation of games to materialize abstract problems demonstrates stronger overlaps with gaming, military thinking, space and scenario development (cf. SimCity, Maxis, 1989).

In the morphological setting, game boarding replaces the scientific laboratory with a mappable and movable application to develop **design 'fantasies'** (Maas et al., 2010), whilst the sequential moves on the spatial board develop instantaneous feedback loops for spatial implications (Reinart and Poplin, 2014). This is while advancing methodologies of developmental processes (Bunschoten et al., 1999) that later become policies, new directions in design or, at the extreme, steps towards the production of new urbanities. From this, a first possible conclusion can be drawn on the co-influence of spatial types and tactical concepts. With the development of spatial types or the testing of new formal languages in morphological terms, games linked to space afford the opportunities to ultimately challenge strategies that spatial thinkers themselves have previously left unexplored due to their inability to visualize complex hybrid scenarios.

**Thirdly**, morphological data (blocks, street, plot, functional zones, syntax, density) relevant to mega agglomerations remain untranslatable due to the exponential increase of data layers, data resolution and data complexity at the mega-scale of newly defined regions. In this, with the opportunities presented by game boarding, the use of data is downplayed to highlight different opportunities for **urban scenarios development** (cf. Chung, 2001). With the gameboard the de facto spatial laboratory of testing and retesting,

data sets become supportive rather than directive. Only once scenarios have been weighted, in accordance with the larger strategy, will data acquisition become a useful and necessary tool for linking GIS, BIM, and ecological variables to a morphological premise.

### **The Methodology of Applying Gamification to Morphological Strategies**

Pedagogies of morphology and gamification methodologies are applied in 'high-intensity settings' through a three year collaborative master's studio between a Design School and a Technical University (<https://deltamegaregions.net>). Entitled Systems and Strategies, Greater Bay Area (GBA) - Proliferation of Exacerbated Differences through Strategic Spatial Planning in the Context of Multiplicity and Polycentricity, the studio focusses on the Greater Bay Area (GBA), China, covering eleven cities, and two Special Administrative Regions (SAR). Emphasis is placed on the development of strategic planning models to position 'speculative' planning frameworks for the next 50 years through a morphological oriented curriculum. The working process covers three phases; [a] **conceptual formulation**: involving spatial analysis and evaluation and comparison, [b] **scenario projection**: the scripting of spatio-temporal speculative proposals to foster new *economies, mobilities, ecologies and patterns of living*, and [c] **design implementation**: the exemplification, integration, codification and visualization as spatial policy. The step-by-step summation here draws from the spatial outcomes of seventeen morphological reformulations for sites of agglomeration. A 1:200 000 territorial map, covering ten cities and 86 million inhabitants, is the primary working medium for the duration of the analytical phases and gameboarding whilst working groups are between three to four in size, later iterations break this down into zoomed-in frames to confirm and exemplify stages [a] and [b] and to provide coherence for stage [c].

*Phase 1, GBA Spatial Analysis and Evaluation and Comparison*, provides students with the GBA's planning context and regional understanding. Moreover, the territorial analysis reflects the supportive systems and how the morphologies become co-dependent on mobility and functional units of cities. Analysis of monocentric versus polycentric territories and how planning regimes mechanize specific urban forms steer the insight into the GBA's agglomeration context. A tracing of urban agglomeration is conducted in three analytical layers. **Layer set 1**, the morphologies of 'cityness', emphasizes the typologies of city amalgamation. Amalgamation between regions and their morphological expression as city, village, town, 'mega' city, 'mega' developments, undefined, planned regions, and natural landscapes fall within the scope of the layer. Comparisons with other "bay" cities may provide an additional comparison. **Layer set 2**; the morphologies of 'urban characteristics', assesses natural features, water bodies, land reclamations, green zones, new towns, historic regions, mega housing development, 'unused' zones, parks and recreational areas. As a layer, the emphasis herein shifts to the units of territorial morphology, allowing for the further digestion of what constitutes morphology for mega scales. **Layer set 3**; the morphology of infrastructure concludes with

documenting airports, harbours, production cities, financial cities, agriculture regions, electrical schemes, and mega industrial projects.

**Phase 2, *Negotiating and Propositions Development of Gameboard Strategies for the GBA***, focuses on materializing future strategies for the GBA region. It operates by questioning; what are the morphologies, logics, implications, potential ecosystems, and regional implications of new regional propositions and, how can each speculation find 'ground' in the GBA? A key understanding here is to assign strategies as 'landscapes of difference' into areas of the GBA.

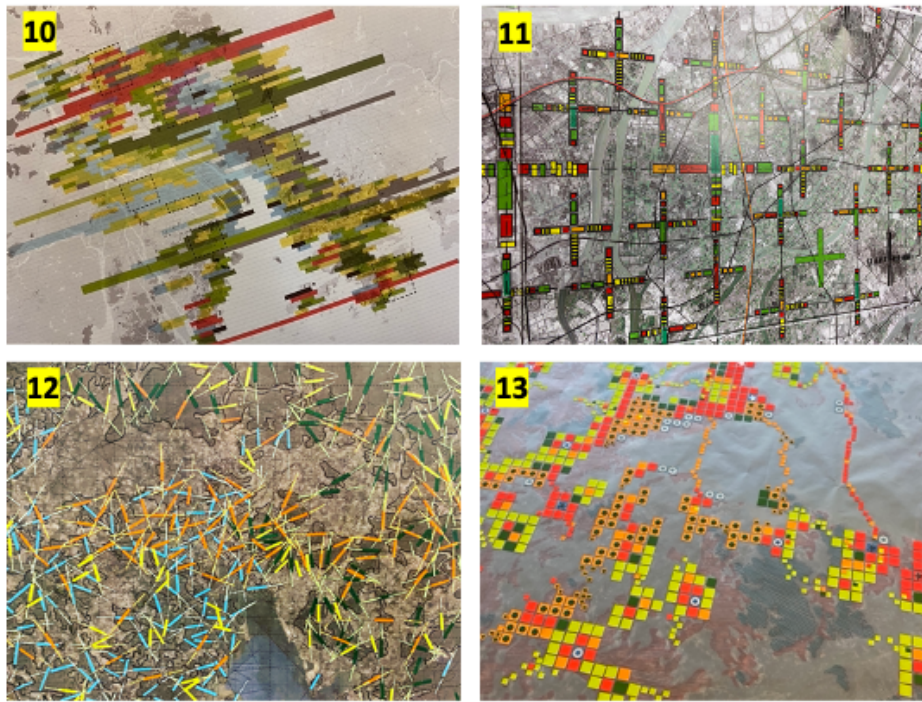
The first part here is short and instantaneous, in process and timeframe. Through assigned themes, groups examine the morphological implications, negotiating advantages and disadvantages to the 1: 200 000 scale. This integration remains an approximation with no specific precision. Thereafter, as a follow-up, each themed strategy requires enlarging the scales to render visible specific realities and scales. For example, with the addition of 20 new Special Economic Regions using a morphological theme of point or blocks, what types of industry or economic activities would support such regions, and how would this have to be negotiated within the GBA context and surroundings?

For each of the scenarios, the outcomes are not meant to represent a definitive model but use the model to articulate a framework. Comparison with other strategies follows a constant refinement of the working map 1:200 000 before proceeding to the 1:50 000 detailed map. In this stage, the importance of density and nodal configurations remains the primary concern as the expression of each of these nodal qualities will vary per theme and nodal type. For the 2021 cycle, the four allocated themes included [a] pointillist strategies, [b] strip development strategies, [c] cross development strategies and [d] edge development strategies. **Theme one, pointillist strategies for the GBA region**, outline the development of a differentiated grid approach to spatial planning. This permits the fine-grained programming of formerly zoned or delimited territories, proposing that a wider range of development types can be programmed or reprogrammed into the existing cityscapes of the GBA. The key focus here positions a strategic approach to *economic* development that outlines smaller and larger clusters that produce 'mega', 'medium' and 'small' Special Economic Regions (SER) across the GBA territory. **Theme two, strip development strategies**, explores territorial strips to provide new spatial distribution to reconfigure urban agglomerations. Conventional infrastructure driven development models follow a centre, node and periphery orientation. The strip approach positions an asymmetrical model, where the variety of functional strips challenge types of morphological and social mixing through linear adjacencies and the development of morphological granularities. Of particular interest herein is the massive intensification of cross borders conditions and how commercial and financial sectors are derived along the long axes from a strip whilst permitting the close adjacency of a number of other strips on the perpendicular axis (formal, informal, coherent and piecemeal compositions) across the territory. **Theme three, cross-development strategies**, explores the spatial figure of the cross or intersection attractor point as an

integrated morphology. This has its origins in early settlement evolution where cities, marketplaces, defensive control points, political domains and economic opportunities intersected. For example, where a bridge might cross a river, or a train line intersects with a road. Also formally deployed in modernist planning approaches, the cross-model questions what types of intersecting conditions, morphologies and programmes can give rise to difference? What are the scales and impact of these, and how do these spatially extend out from each intersection point(s)? Furthermore, can such spatial intersections shift the centre of gravity for territories, CBD's or distract attention from other zones? **Theme four, edge and periphery strategies**, explores the proliferation of edge conditions (desakota, peripheries, peri-urban conditions, proto-urban conditions) that arise with dis-aggregated and sprawl morphologies. The 'edges' mark discontinuities between different heterogeneous morphologies, landscapes, geographic conditions, socio-economic zones, functional districts, built and unbuilt qualities. The theme questions what types, scales, operational and dynamic factors exist in each edge? How do edges define zones that are crust-like versus spaces that are ill-defined (un-planned, blurred and gradations)?

**Phase three, Refinement and Datalinks.** After six weeks and twelve iterations, the morphological outcomes from gameboarding are compared with geospatial, social, economic and environmental data. Enlarging two, ten by ten-kilometre areas allows for comparative metrics on population density, built-up area ratios and land use distribution, landscape fragmentation, social composition, and economic distributions to morphological propositions. Additionally, enabling speculative staging and temporal evaluation of morphological growth and change. Although still large in scale, both samples allow for nuancing (developing morphological variations) and further integration into the GBA through policy instruments that facilitate the production of such forms.





**Figures 01 - 13.** As validation, a collection of ten images depicts the process and the outcomes of morphological gameboarding. Figures 01 - 04 captures the classroom settings (online and face-to-face) required for gameboarding (table formats, group size, spatial elements, and video camera). Figures 05 - 07 documents the iterative process. Specifics here relate to the use of elementary play pieces (strips of paper, whiteboard pins, string, and any movable element) to help make moves on the map. With figures 08 – 09 captures part of the three year outcomes and various morphological propositions. Figures 10 – 13 enlarges details of the morphological propositions of the linear strip city morphology (fig. 10), cross city (fig. 11), linear city (fig. 12) and pointilist city (fig. 13).

## Conclusions

With over three years of curriculum development, our first conclusion highlights the need to develop more instantaneous means to test projective and methodological urbanization types. The coupling of speculative methods to projected urbanization helps to shift our generic perspective of the conventional urban planning approaches towards transformative potentials. Secondly, leveraging these outcomes, we foresee the continuous evolution of open-ended spatial speculative tools, not as a less informed methodology within a binary-driven data paradigm, but as one that will allow for the collective responses with concrete design possibilities with newly defined territorial characteristics and new forms of differentiation. The freedom afforded by gameboarding's experimentation loosens digital rigidity, exposing opportunities to students to further link morphological development to other environmental and eco-systemic questions, for example, the formation of large-scale new urban ecologies, circularity, and morphology and even decolonial and neo-colonial morphological forms. Thirdly, the value of hybridizing morphology and gameboarding in a design studio context exposes *students to the development of interpersonal capacities, whereby design decisions are coupled to negotiation tactics between peers in the studio environment, and the necessary spatial and morphological tools for this that have applicability beyond.*

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