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大都市区的棋盘博弈：区域设计中形态学主题的运用

Speculative Gameboarding for Megaregions: Using Morphological Themes for a Pedagogical Approach to Regional Design in the Greater Bay Area, China

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摘要：中国空前的城市化速度与规模亟需更先进的规划设计策略。探索基于形态学的区域设计研究教学方法，从而制定体现中国大都市区特征的空间策略。在设计课程背景下，介绍了以形态学主题为基础的探索性棋盘博弈这一方法论，并应用到粤港澳大湾区空间转型的场景设计中。评估了香港理工大学设计学院和代尔夫特理工大学城市学系连续 4 年的一系列合作成果。1）沿着设计课程的流程，阐明了教学轨迹。2）调查了不同形态学主题如何影响学生的设计成果，对比了成果的空间特异性以及设计提案的激进程度。3）探讨了是否部分形态学主题更适用于大湾区社会文化与环境的特殊性。在 6 次课程中，学生们研究了 8 个形态学主题：点状、线状、条状、巨型街区、放射状、环状、交叉状和边缘状。实践表明存在冗余的主题，因此对主题的进一步确立值得深入研究。需要指出，2 所大学的设计课程存在差异，这似乎也影响了棋盘博弈法在各自课程中扮演的作用。整体而言，此教学方法论可以产生远超传统空间规划的设计策略。因此，以形态学主题为基础的棋盘博弈是一套充满前景的方法论，并且今后有望结合更多利益相关方的参与，进行进一步深化和测试。

关键词：城市形态学；区域设计；大都市区；棋盘博弈；大湾区；设计教学；通过设计做研究

Abstract: The unprecedented speed and scale of urbanization in China calls for advanced planning and design strategies. This paper aims to explore a new pedagogical approach that cultivates morphological regional design studies to develop spatial strategies that acknowledge the complex and diverse urban landscapes of Chinese megaregions. Accordingly, the objective is to compare different morphological themes that form the basis for speculative gameboarding as a regional design methodology in the setting of academic planning and design studios. The paper evaluates a collection of outcomes from four years of collaboration between The Hong Kong Polytechnic University's School of Design and the TU Delft's Department of Urbanism. Here, gameboarding was used as a methodology to draft scenarios for large-scale spatial transformation in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA). Firstly, the paper explains the pedagogical trajectory of the studios along their three main phases — analysis, gameboarding, and evaluation. Secondly, it is investigated in how far the given morphological themes informed the design outcomes of the students. These outcomes are compared with regard to their spatial specificity as well as the radicalness of proposed transformations. Lastly, it is discussed if some of the themes are more suitable than others to respond to the socio-cultural and environmental specificities of the GBA. In six design studios, students worked on eight different morphological themes: pointillist, linear, strip, megablock, radial, ring, cross, and edge. It is found that redundancies exist between some of the themes, which suggests that the consolidation of themes might be worth exploring. Furthermore, the different context of the studios in the two universities seems to affect the role that gameboarding takes in the process. Overall, the teaching methodology has proven to generate a wide range of design strategies that point far beyond conventional spatial planning solutions. Speculative gameboarding with morphological themes is therefore a promising methodology that may be further enhanced and tested for other forms of stakeholder engagement.

Keywords: urban morphology; regional design; megaregions; gameboarding; Greater Bay Area; design education; research by design

自 20 世纪 90 年代以来，中国经历了一个史无前例的增长时代。人口、经济和城市面积的增长速度与规模在全世界范围内都是前所未有的 [1]。即使近年来新冠肺炎病毒（COVID-19）和低生育率为增长趋势带来了不确定性，但是中国雄厚的经济实力和稳定的政治体系仍然正在进一步推动社会和空间层面的大规模转型 [2-4]。在中国的规划体系中，汇聚多个国家和全球重要功能中心的城市聚集区——大都市区（megaregions），已经作为城市发展的重要战略基点而备受关注 [5]。因此，应对中国独特的城市化形式仍然是当前适时且紧迫的挑战，特别是在巨型区域化（mega-regionalization）发展的复杂性正加剧着这一挑战的情况下。本研究将特别关注上述背景下的空间特征，以及在这一规模尺度下将未来发展概念化的可能性。

城市学（Urbanism）是一个跨度广泛的学科，其工作核心围绕横跨多个尺度的空间转型。该学科整合了来自不同领域的方法 [6]。作为于 20 世纪以来（重新）得到关注的城市学的重要组成部分，区域设计（Regional Design）同样也是如此 [7]。区域设计融合了来自城市设计、空间规划、景观规划和环境规划的方法，成为一个强有力的工具，可以通过设计引导城市化进程摆脱传统城市核心区限制——这种设计虽然具体针对物质空间，但不局限于物质空间。此外，区域设计的核心潜力之一是它允许学者和从业者“对未来进行战略思考”[8]44，从而“挑战或丰富主流空间概念”[9]72。因此，它是一门颇有前景的学科，具有在符合中国特定规划模式的尺度上应对各种城市挑战的潜力。

笔者深入研究了作为学术性规划和设计课程方法论的探索性棋盘博弈（speculative gameboarding），以探索巨型区域化背景下的各种区域设计替代性策略。棋盘博弈（gameboarding）是一个以团队合作设计为基础的，通过直觉的、游戏性的方式来开发空间策略的过程 [10]。本研究参照的具体活动为香港理工大学（中国香港特别行政区）与代尔夫特理工大学（荷兰）在 4 年的合作中开展的设计课程。事实证明，这一合作教学所采用的工作方法非常适合在区域设计层面展开新的探索，且可以激发来自不同学科的参与者对城市 - 区域问题的整体性和颠覆性思考 [11-12]。关于在这种设计环境下产生的设计成果的水准，目前的研究还比较少。因此，笔者研究了上述合作设计课程中与各种形态学主题相关的项目，重点关注成果的质量和多样性，其中包括这些成果在拓展针对中国的区域设计策略方面的潜力。在深入论述本研究的方法论之前，首先回顾了必要的理论背景，澄清了巨型区域化的一系列问题以及对“新”应对策略的需求。

1 背景

1.1 巨型区域化

在过去的 150 年，很多术语试图定义区域尺度下的城市化进程。Dawkins 指出，区域发展理论大多来源于 19 世纪末经济学家的研究 [13]。一个侧重于空间层面的、与当代对城市化的理解更接近的开创性理念，来自 Geddes 和他的城市集聚区（urban conurbations）概念 [14]，始于如下的观察：城市地区日益扩大，超出了通常在地图上划定的“点”[14]30，形成越发庞大的、连续的集聚体。类似的观察使得 Mumford 提出了巨型城市（megalopolis）的概念 [15]，而这一概念后来又被 Gottmann 所重拾并发扬光大 [16]。他将美国东海岸（从波士顿到华盛顿）确立为 20 世纪区域城市化的原型。自 20 世纪 70 年代以来，全球化的影响不断上升，促使这些概念进一步发展：极具影响力的一些研究，如对世界城市（world cities）[17] 和全球城市（global cities）[18] 的研究，进一步推动并在 20 世纪末创造了全球城市区域（global city-regions）[19] 的概念。如今又涌现出了大量的不同概念，例如：都市连绵区、远郊地区、巨型城市区域、超级区域和都会区，这些概念都意图去描述基于一个普遍现象的共识：区域尺度上具有强大内部和外部联系的城市和经济聚集区的扩张。

在 21 世纪，大都市区这一术语越发得到广泛认可，被用来描述与全球经济紧密相连的区域城市化的新形式 [20]。大都市区不仅被用作一个概念性的构想来衡量世界不同地区大城市圈的聚集程度 [21-22]，同时也被作为一种手段来促进城市 - 区域发展中的机构合作和协调方式 [5, 23-24]。对于批判性城市研究来说，关注巨型区域化可以在兼顾全球性因素和当地特殊性的情况下，对多尺度的城市转型进行全面考察。

1.2 规划与设计巨型区域

将巨型区域化视为当代城市化进程的核心组成部分，可能会从根本上挑战传统的规划和设计方法。传统的以监管控制为关注点的空间规划，特别是在欧洲，往往会忽视功能和物质空间转型的结合，以及影响到巨型区域化进程的公共部门和私营部门意愿的二元性 [20, 25-26]。而区域设计则可以为空间规划提供一个有价值的替代方式，因为它通常致力于对未来发展愿景的构想，并且这些愿景关注于由城市形态和城市经济所塑造的物质空间转型 [9]。此外，区域设计中分析和预测的迭代过程使其成为一种可以用于整合公共和私人利益相关者不同见解的有用工具 [8]。因此，区域设计的作用并不在于取代空间规划，而应被视为传统空间规划模式的补充工具，同时也有潜力应对巨型区域化所带来的特殊问题。

中国的城市发展框架强调的是区域规划，比较少提及区域设计。尽管如此，战略性设计思维在中国的规划实践中是普遍存在的，这为引入区域设计提供了基础，从而使规划能够更好地应对中国快速城市化带来的不确定性 [27]。系统性地探索这种可能性将有机会弥补这方面的知识缺口，并推动中国规划和设计领域的结合。

此处需要提到一些相关的设计方法，以便帮助我们更精准地定义区域设计对中国目前规划议题的贡献。在 Chora 的工作中我们可以看到应对宏观尺度空间转型的探索性方法论 [10]，通常指向更具战略性的方法，以应对大都市区发展的不确定性。此外，景观都市主义 [28] 或三角洲都市主义 [29] 的出现，有望使侧重于经济竞争力和凝聚力的规划向更具有全局观的规划方式转变，从而更加强调在城市扩张与社会环境问题间保持平衡的重要性。这些方法也被证明与区域设计的核心意图一致，尤其是在中国 [30-31]。本研究提出的方法论

意在充分发挥这些创新性和颠覆性实践的巨大潜力，以描绘出规划和设计巨型区域景观的新路径。

2 方法论

2.1 研究目标

简要理论回顾说明了当代中国城市化和巨型区域化模式所带来的巨大挑战。此外，这部分论述还揭示了区域设计方法所具有的潜力——它能够超越传统形式的战略空间规划和城市设计。区域设计的教学则很适合作为这种方法的试验场。

相应的，笔者介绍的设计研究试图探讨一系列替代性区域设计策略，这些策略能够体现中国大都市区城市景观的多样性与复杂性。该研究目的是通过 2 个具体的目标来实现的：第一个目标是在设计课程的语境下，对指导棋盘博弈策略的不同形态学主题进行评估，以便探索大都市区空间和生物物理进程，从而为适应不同的生态区创造统筹的空间形态；第二个目标是对不同主题进行比较，从而在现有的一系列区域设计策略及其相互关联的组成部分中找到冗余和不足——包括前提条件。这 2 个目标都可以借由笔者开展的设计课程的成果来实现。这些课程使用上述方法，充分发挥由设计驱动且具备多尺度系统性的研究的价值。

2.2 数据生成——设计课程

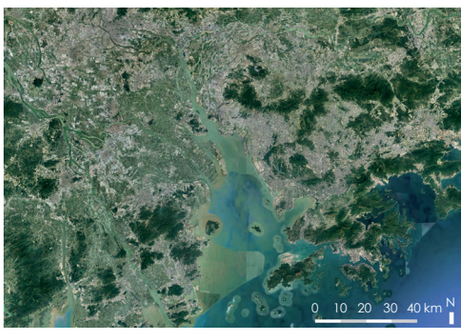
2018—2021 年，香港理工大学设计学院（简称理大）和代尔夫特理工大学城市学系（简称代尔夫特）合作开展了 6 个设计课程。课程的核心目标是为粤港澳大湾区（简称大湾区）未来 50 年的形态发展制定探索性的空间策略。为此，课程在现有理论和教学工作的基础上通过“设计想象”[32] 做出了进一步推进，以及将“游戏”用于城市设计和规划，从而对城市 - 区域问题进行整体性和颠覆性的思考 [33]。因此，它们与本研究的目的完全一致——作为分析和设想的工具来探索针对中国大都市区的替代性区域设计策略。

这些设计课程是理大城市环境设计硕士课程和代尔夫特城市学硕士课程的一部分①。每个课程分别持续 8 周或 10 周，学生划分为 4~5 组，每组有 4~6 名成员。代尔夫特课程的学生人数通常比理大多一些。课程分为 3 个阶段：分析、棋盘博弈和评估。

分析阶段的目的，是让学生熟悉大湾区以及对研究问题做出初步陈述。分析是在 1∶200 000 的比例上对整个大都市区进行的（图 1）②。课程鼓励学生通过鉴别并注重基础设施网络、人居环境模式和生态环境动态等因素，来逐层地、批判性地考察该大都市区，从而为起草后续方案提供论据。分析阶段在理大课程中占用 2~3 周，而在代尔夫特课程中占用 3~4 周。在代尔夫特，学生们在进入这一阶段之前还需要对都市化和全球化背景下的城市化理论文献进行回顾。

棋盘博弈阶段是将研究和设计过程从描述转向提案的决定性步骤。在这一阶段，不同的学生小组会分配到不同的形态学主题。在与分析阶段相同的尺度上，学生们通过使用廉价的材料，如彩纸、纸板、毛线、大头针或贴纸，根据直觉判断、即时地“布局”空间策略。这些诸如条状、点状和环状等形态学主题通常会激励学生在一个巨型尺度上提出自信且激进的主张。通过这个练习我们传达给学生的一条重要信息在于，要接纳“景观的差异性”，而这是基于以下假设：在大湾区这样地域辽阔的区域，将不同城市景观同质化的简单处理模式是不可行的 [34]。学生可以在组内扮演不同的角色，从而激发能够体现不同（潜在）利益相关者需求的辩论。通过引入视觉规则作为形态变迁的表达方式，该设计过程的游戏性将得到进一步增强，有助于引导学生进一步提出综合性的区域发展原则。棋盘博弈阶段涉及以小组讨论和设计评图形式进行的多次迭代过程。它在理大课程中持续 5~6 周，而在代尔夫特课程中持续 2~3 周。

最后的评估阶段有助于评估第二阶段的提案，从而导向具体的设计和政策建议，以及对提案中区域发展策略的批判性反思。在 4 年的合作过程中，这一阶段的内容相对其他阶段更灵活多样，包括更多小尺度的常规城市设计以及简单形式的地理空间分析。评估阶段在理大课程中占 2 周，在代尔夫特课程中占 3~4 周。



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1 粤港澳大湾区核心区域的航拍图
Aerial view of the core of the Greater Bay Area

如上所述，不同学校分配给 3 个项目阶段的时间各不相同。棋盘博弈阶段是本研究的重点，在理大的教学设定中作为课程的核心部分，时间跨度约为 6 周。在代尔夫特课程中，棋盘博弈则仅为期 3 周，占整个课程不到 1/3。除此之外，两校课程所设定的教学环境并无明显差异，因为理大的教学人员会定期参加代尔夫特课程的设计评图和方案汇报活动，反之亦然。尽管如此，两校的学位课程设置和教学方法之间还是存在一些细微差别，这可能会对项目成果产生影响，后续将对此进行讨论。

2.3 数据综合分析

本研究利用设计课程的成果对不同形态学主题的适用性进行了分析，并且从更广义的角度，探讨了棋盘博弈作为一种区域设计策略的实用性。因此，分析工作分为 2 个主要步骤进行：第一步，是评估设计成果的总体质量，即它们在推进区域设计策略方面的潜力；第二步，是综合不同形态学主题的成果并进行比较，从而研究不同策略方法之间更具体的差异。因此，本研究属于诠释性研究，此类研究通常使用定性方法来理解特定的社会现实，比如内容分析和整合分析等方法 [35]。下文将简要介绍这项研究的 2 个主要部分。

为了解现有设计成果的整体情况，笔者对 6 个课程的所有材料进行了回顾。棋盘博弈阶段的早期视觉成果是回顾的重点。这是学生初次接触形态学主题的阶段，这也是可以在阶段性成果中最清楚地看到不同主题之间差异的时候。研究工作首先根据 2 个主要类别——空间特异性（spatial specificity）和干

表 1 不同形态学主题应用时间和频率汇总

Tab. 1 Overview of the time and frequency at which the different morphological themes were used

形态学主题 morphological theme	2018 年项目 projects from 2018	2019 年项目 projects from 2019	2020 年项目 Projects from 2018	2021 年项目 projects from 2018	项目总数 sum of projects
放射状 radial	理大 – 面授 PolyU – f2f				1
环状 ring	理大 – 面授 PolyU – f2f				1
点状 pointillist	理大 – 面授 PolyU – f2f	理大 – 面授 PolyU – f2f 代尔夫特 – 面授 TUD – f2f	代尔夫特 – 线上教学 TUD – online	理大 – 面授 PolyU – f2f 代尔夫特 – 线上教学 TUD – online	6
条状 strip	理大 – 面授 PolyU – f2f	理大 – 面授 PolyU – f2f 代尔夫特 – 面授 TUD – f2f	代尔夫特 – 线上教学 TUD – online	理大 – 面授 PolyU – f2f 代尔夫特 – 线上教学 TUD – online	6
线状 linear	理大 – 面授 PolyU – f2f	理大 – 面授 PolyU – f2f 代尔夫特 – 面授 TUD – f2f	代尔夫特 – 线上教学 TUD – online		4
巨型街区 megablock		理大 – 面授 PolyU – f2f 代尔夫特 – 面授 TUD – f2f	代尔夫特 – 线上教学 TUD – online		3
交叉状 cross				理大 – 面授 PolyU – f2f 代尔夫特 – 线上教学 TUD – online	2
边缘状 edge				理大 – 面授 PolyU – f2f 代尔夫特 – 线上教学 TUD – online	2
总计 total	5	8	4	8	25

注：“面授”表示课程的大部分活动是线下面对面进行的。“线上教学”表示课程中的大部分活动是通过视频通话进行的。学生的组内活动可能 2 种模式都包括。

Note: “ f2f” indicated that the majority of activities in the studio was conducted face-to-face. “online” indicates that the majority of activities in the studio was conducted through video calls. Work within the student groups may have happened in different modes.

预手段的激进程度（radicalness of interventions）对不同的项目进行了比较。后者与本研究的目的有关，即探寻区域设计的替代方法——这些方法有的谨慎扩大优势，有的大刀阔斧重构，来应对大都市区当前正在发生的巨大转型。前一个类别——空间特异性，与区域设计的潜力有关，即能够将空间规划的战略指导纲领与城市设计的物质空间特异性相结合的潜力 [7, 36]。笔者认为，在区域尺度上将战略性思维与具体的形态学表达结合起来，可以从实质上推进区域设计，及其对更广泛的可持续城市化议题的贡献。

在通过以上类别对不同项目进行概括性的比较后，笔者又通过形态学主题对这些项目进行了分类和对比。此处，为了评估每个主题的实用性，笔者探究了它们成果的相似性。第一个步骤是看某个具体的主题在其所属类别中的得分情况。第二步，逐一浏览现有的成果，根据主题之间的冗余性来确定潜在的主题合并可能，并发现有待进一步研究和填补的空白。与暴露缺陷相比，寻找最佳实践案例对于这一部分的研究更有意义，因为这有助于突出那些看似很有前景，并且可以运用在后续的迭代过程中的策略方法。

3 设计成果

本节主要介绍分析的结果。起始部分介绍大湾区的概况，这也是所有设计课程主要关注的地理范围。其余部分介绍各课程的设计成果，并根据前文介绍的方法论对其进行对比和评析。

3.1 粤港澳大湾区

粤港澳大湾区，同包括北京在内的京津冀城市群以及包括上海在内的长三角城市群一样，是中国 3 个“超级城市群”之一 [22]1。它位于中国南部，包括 9 个城市——广州、深圳、佛山、中山、东莞、珠海、江门、肇庆和惠州，以及 2 个特别行政区——香港和澳门。在大约 56 000 km² 的土地上，居住着约 6 000 万 ~9 000 万的人口 [37]。该城市群对中国 GDP 总量的贡献率为 12%，其经济产出与加拿大不相上下 [38]。大湾区内存在着各种经济特区、自由贸易区和其他政策机制，使其成为中国最强大和最全球化的经济体之一 [39]。在未来的几十年里，粤港澳大湾区的人口和经济都有望持续增长。

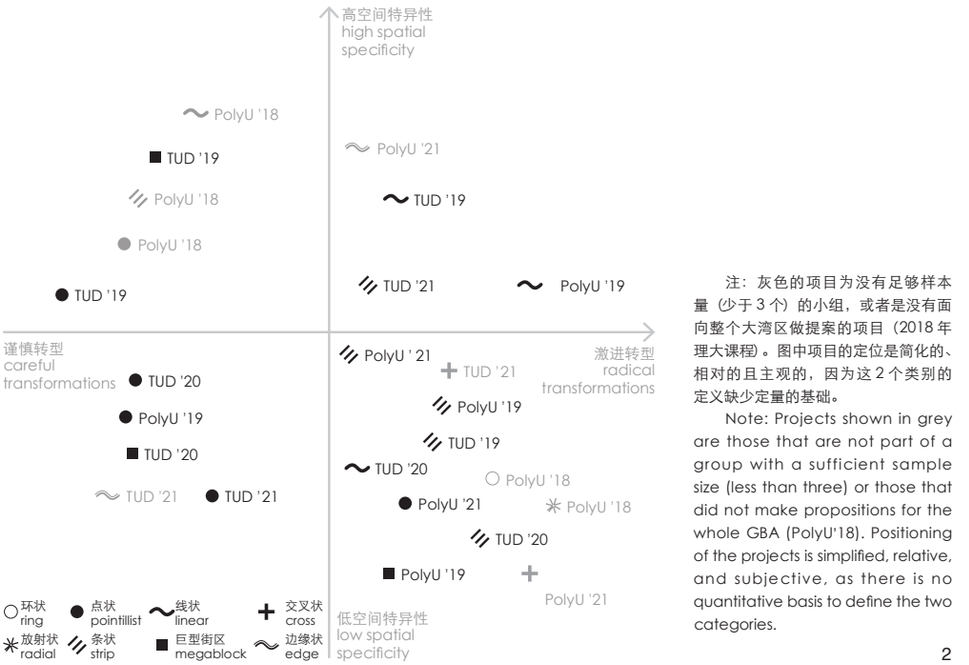
至少从中国于 2011 年公布的“十二五”规划起，大湾区独特的重要性便得到了国家层面的认可并且被给予了大力支持 [5]。然而与此同时，粤港澳大湾区的快速发展与珠江三角洲的自然系统和该地区多变的气候条件相冲突，这构成了巨大的生态风险，有可能会反过来严重影响经济发展 [40]。粤港澳大湾区的社会 - 经济 - 环境的深度关联性使其成为研究当代巨型区域化进程的主要案例。

2021 年课程中提供给学生的大湾区底图（图 1），并不包括大湾区的全部行政区划范围，而是集中在大湾区核心的城市化程度最高的部分。因此，它以深圳的东部边缘以及佛山和广州的西部边缘为界。往年也给学生提供了类似的底图，因为事实证明这个研究范围可以让学生在分析和棋盘博弈阶段达到比较合适的细化程度。大多数小组使用的是该地图的 A0 打印版，相当于 1∶180 000 的比例。而在线上开展的课程中，有时使用了该地图更小的版本。除航拍图以外，还使用了不同的图层，如建成区、公路、铁路和不同类别的非建成区。下文将探究不同的设计成果是如何投射到这些底图上的。

3.2 8 个形态学主题

在这 6 个设计课程中，总共产生了 25 个项目。这些项目涵盖了 8 个不同的形态学主题：放射状、环状、点状、条状、线状、巨型街区、交叉状和边缘状（表 1）。这些主题

每一个都意味着一种形态学表达方式，用来对大湾区的城市景观进行空间的概念化和探索。每个课程都对这些主题进行了简短的解释。例如，点状策略将城市景观视为一个网格系统，在其中可以规划设定出体现细微差别的开发类型和功能节点。再比如，条状策略提出的空间构成是由较短的线形空间形成较大尺度的发展走廊，从而利用各自相邻的具有功能多样性的条状空间来挑战当前的中心 - 外围空间模式。关于所有主题的详细描述，请读者参考附录 A[③]，或笔者之前的工作 [41-42]。使用频率最高的主题是点状策略和条状策略——每类都有 6 个项目。而使用频率最低的主题是放射状策略和环状策略，这 2 个主题在 2018 年理大的第一个课程之后就被放弃了。交叉状和边缘状主题只在 2021 年的课程中被引入，因此它们分别只有 2 个项目。根据主题的使用频率，有基础进行充分评估的主题是点状、条状、线状和巨型街区，每个主题至少有 3 个项目。由于其他 4 个主题的使用频率有限，它们主要作为附加案例来提供一些总体印象上的补充。



注：灰色的项目为没有足够样本量（少于 3 个）的小组，或者是没有面向整个大湾区做提案的项目（2018 年理大课程）。图中项目的定位是简化的、相对的且主观的，因为这 2 个类别的定义缺少定量的基础。

Note: Projects shown in grey are those that are not part of a group with a sufficient sample size (less than three) or those that did not make propositions for the whole GBA (PolyU'18). Positioning of the projects is simplified, relative, and subjective, as there is no quantitative basis to define the two categories.

2

2 基于两根轴线对学生项目进行分类：空间特异性和转型激进程度

Categorization of the student projects along two axes: spatial specificity and radicalness of transformations

3.3 分析一：评估

正如方法论章节所提出的，对于设计成果的评估关注在空间特异性和转型策略的激进程度两方面。空间特异性在这里被定义为：成果的视觉表达在多大程度上能够体现已有的城市景观特征。这可以通过个体元素间的细微差别、视觉元素类型的高度多样性或个体元素的高细节度来实现。转型的激进程度（radicalness）在这里指的是成果所提出的新区域形态与现状之间的差异。对有限的地区提出微小的功能改变被认为是谨慎的转型；而提出全新、大规模的扩大或缩减当前建成空间的主张被认为是一种激进的转型。

图 2 显示了 25 个项目在两条轴线上的直观分布。位于图表上半部分意味着这一项目可能更适合为推进区域设计策略做出实质性的贡献。然而，位于第一象限的那些体现较高空间特异性且思路激进的项目，并不一定意味着它们是“更好的”。下文介绍的主观分类方式更应被视为激发讨论的工具，而非对项目的最终评判。

从初始的分类中可以明显看出，不少项目倾向于提出低空间特异性且激进转型的方案，第四象限涵盖的项目最多（11 个）。剩余项目在其他 3 个象限的分布大致相同。大约 2/3 的项目（16 个）位于图表的三四象限，即提案的空间特异性较低。图表第一象限涵盖的项目最少（4 个），即提案属于高空间特异性和激进转型项目。对这种分类方式进行过度的定量解读会违背本定性研究的宗旨。因此，下文将深入解读上述研究。

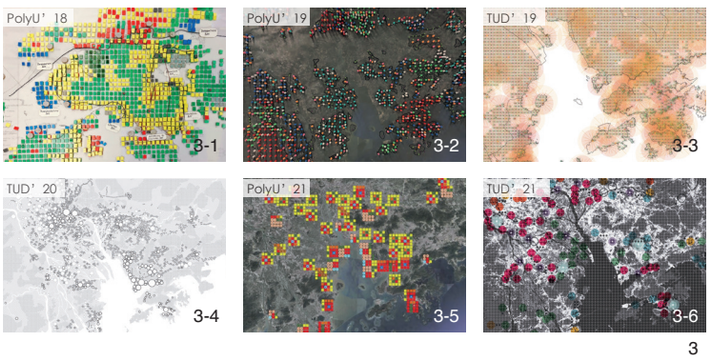
3.4 分析二：比对

根据前文提出的目标，余下的分析步骤是对不同的主题进行比较，以发掘它们的重复之处和研究空白。在此，研究主要针对样本数量充足的一些主题展开：点状、条状、线状和巨型街区。其他 4 个主题则被用来进一步阐明第一轮的比较。

对图 2 的进一步分析可以看出，最谨慎的转型主张是在点状策略的项目中提出的，而最激进的提议则来自线状和条状策略的项目。空间上特异性不足的提议主要来自点状和条状策略。巨型街区项目在这里很难定位，因为 3 个相关的项目分布在 3 个不同的象限。因此，对不同的主题进行整合可能是有必要的。此外，对项目本身的进一步研究可能有助于认识到更多的个体差异。

纵观棋盘博弈最终迭代的总体情况（图 3~7），可以提出一些发现。首先，点状和巨型街区这 2 个主题之间存在着明显的重叠。点状策略倾向于使用图钉和其他圆形物件，但也会使用巨型街区策略中常用到的方形材料。例如，理大 2021 年项目提出的点阵式空间组团与理大 2019 年项目或代尔夫特 2019 年项目提出的巨型街区集群非常相似。这表明，在大湾区中识别并扩展现有的巨型街区结构的策略 [43] 可能很难在大都市区的尺度上实施，因为这基本只能引导学生提出中心节点 - 外围组团的空间策略。因此，尽管巨型街区作为形态学现象对理解大湾区的城市发展很重要，但它是否适合作为在大都市区尺度上进行棋盘博弈的形态学主题是需要质疑的。相反，将对巨型街区主题的认知融入到点状策略中可能更有价值，从而可以利用点状的简单性来开发适用于不同尺度的节点与组团的精细化策略。

另一组潜在可以合并的主题为线状策略



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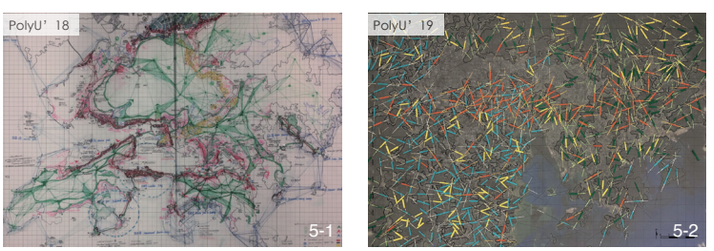

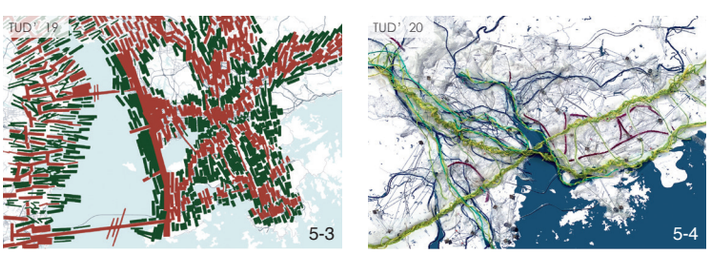

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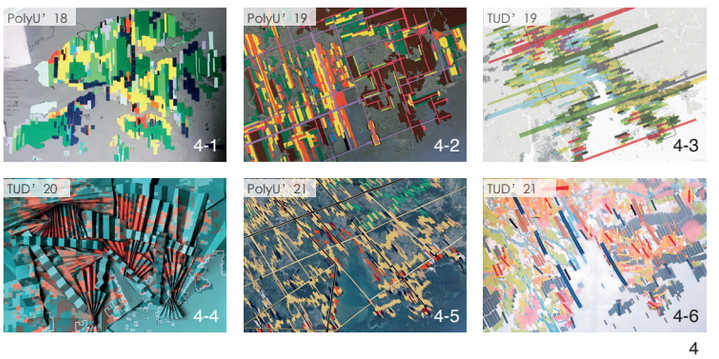

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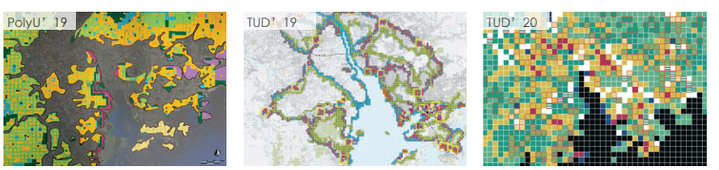

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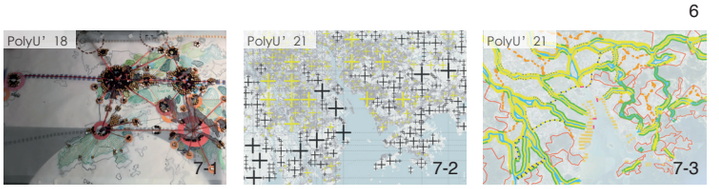

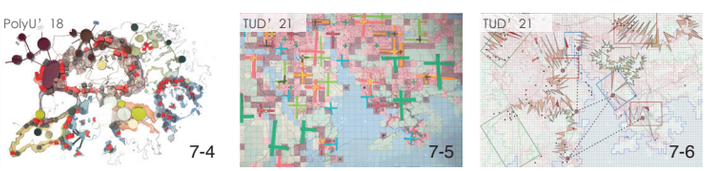

7

3 采用“点状”形态学主题的小组成果的最终迭代版本
Final iterations of groups that were working on the morphological theme “pointillist”
4 采用“条状”形态学主题的小组成果的最终迭代版本
Final iterations of groups that were working on the morphological theme “strip”
5 采用“线状”形态学主题的小组成果的最终迭代版本
Final iterations of groups that were working on the morphological theme “linear”

6 采用“巨型街区”形态学主题的小组成果的最终迭代版本
Final iterations of groups that were working on the morphological theme “megablock”
7 采用“放射状”（7-1）、“环状”（7-4）、“交叉状”（7-2、7-5）和“边缘状”（7-3、7-6）形态学主题的小组成果的最终迭代版本
Final iterations of groups that were working on the morphological themes “radial” (7-1), “ring” (7-4), “cross” (7-2, 7-5), or “edge” (7-3, 7-6)

和条状策略。在 2019 年的课程中，这 2 个主题都有被使用，可以观察到一些交叉点。例如，代尔夫特 2019 年项目的线状策略使用了功能集聚区的相邻组合，而这原本被认为是条状主题的关键策略。同样，理大 2019 年项目的线状策略使用了表达城市构型的短的重叠线段。从整体上来看，这些组合线段极其类似于通过凝聚功能相对单一的片区来实现城市多功能性的条状策略。因此，将线状策略和条状策略合并为一个线状主题可能更为有效，而这将积极助推廊道和条状两类空间发展方式。

交叉状和边缘状是最新引入的 2 个形态学主题，它们也提供了与先前主题合并的可能性，从而丰富了“定点”和线状策略的范畴。交叉状空间策略展现出建立集中节点的显著倾向，特别是在理大 2021 年项目中。代尔夫特 2021 年相关项目在从十字交叉点延伸出来的空间轴线上展示出了一些更丰富的变化，但重点似乎仍在于创建以各个城市中心为优先的城市系统。另一方面，边缘策略主题似乎引入了一些连线状主题本身都未能实现的严格的线状策略。特别是理大 2021 年项目的边缘状策略项目成功地阐述了沿着建成区 / 非建成区的过渡地带展开的干预措施，显示了其高度的功能多样性，同时也能够与条状策略的空间构成明显区分开来。代尔夫特 2021 年项目的边缘状策略项目则是通过“之”字形轮廓所表达的空间策略实现了类似的效果。因此，至少从早期的测试结果来看，交叉状和边缘状策略是对现有主题范围非常有价值的补充。

放射状和环状在所有项目中很难定位。这 2 个主题都需要更多样本，特别是在大湾区的尺度上。从现有的项目（理大 2018 年项目）来看，可以说，环状策略具有明显的线性导向，而放射状策略则具有显著的节点导向，正如这 2 个主题背后的几何学特征所暗示的那样。

除了形态学主题本身的差异外，理大和代尔夫特 2 个项目之间的差异也很突出。此处发现的关键差异在于：理大的项目更倾向

于提出激进转型的方案，13 个理大项目中有 9 个被定位在图 2 更激进的一侧。而代尔夫特的项目则在谨慎和激进转型之间均匀分布。一个可能的解释是，代尔夫特的学生在分析阶段花了更多时间，而这可能更强调对空间的实证研究，因此限制了他们发挥主观想象力和敢于探索的“勇气”。同时，理大的大部分学生来自中国大陆，从个人角度来讲，对这一地区有更多的熟悉感，从而使他们在一开始便具备棋盘博弈阶段需要的直觉性。这样的经验反映在笔者与学生的个人互动中，偶尔也会体现在项目作品本身里。例如，代尔夫特 2020 年项目的一个小组将棋盘博弈阶段概括地描述为一个“大开眼界的实验”，从而将其定位为研究设计过程中一个虽有价值，但却似乎并非核心的元素。相比之下，理大的各项目组会更明确地将他们的主题称为“形态学策略”，甚至将他们的主题夸大为（城市规划）基本范式转型的基础，例如：从条状形态作为一种空间策略，跨越到设想一个“带型城市”（图 4-1）。

笔者总结上述分析，做出一个假设：各种主题的整合有可能对未来的棋盘博弈方法迭代有益。在此可以提出 2 个关键的主题：点状策略，包括巨型街区、交叉状和星形放射状等相关变体；以及线状策略，包括条状、边缘状和环状等相关变体。在对点状策略进行整合时，一个问题在于，它们的空间特异性似乎都较为薄弱：点状、巨型街区和交叉状等主题的得分明显低于线状、条状和边缘状。因此，在未来的棋盘博弈中，针对点状主题，或其子主题的设计任务书可能必须进行调整。本章介绍的 2 个分析步骤提供了对棋盘博弈——特别是不同的形态学主题——所存在的潜力和不足的全面见解。后文两节对这些见解进行了总结并提出了对后续研究工作的展望。

4 讨论

本研究分析的第一部分（3.3 节）表明，在这 25 个项目中可以发掘大量不同的方法，但在这些提案的空间特异性方面尚存一些改进之处。即使不深究各个项目背后的概念意图，仍然可以明显看出这些项目表达了对空间分布和功能多样化的广泛建议，以及在形态学表达方面令人称奇的创造力。然而，这种多样性尽管令人备受启发，有些许项目仍然忽略了空间的特异性，而这正是区域设计的核心潜力所在。特别是对于那些“定点”策略的主题，需要更多地去探索如何使基于节点空间布局的形态学主题上升到空间策略层面，而非使用类似于传统的多中心规划概念模型将其图表化 [7, 9]。主题和设计任务书的修改可以对此有所帮助，而本研究提出的假设可以作为第一步。

如上一节所述，本研究可以推导出的主要假设是将所有形态学主题整合为 2 个首要主题——点和线。这将帮助学生在区域形态学主题的不同变体中进行更为灵活的选择，并可能创造出教学人员尚未想到的全新主题。在此基础上，可以通过其他方式引入限制规则，比如关于不同价值取向的主题命题。特别是在代尔夫特的课程中，项目经常依据可持续发展的三重底线理论制定非常全面的概念愿景：一切发展都应该是生态的和平等的，同时要维持经济优势。这一目标值得称赞，但它偶尔会导向一些不够明确的提案，而将这些提案通过可行的措施实施并落地是非常困难的。而形态学表达背后的这些价值现象则可能值得进一步探讨。

另一个值得进一步研究的问题是，大多数项目都有促进城市空间集聚的意图。虽然设计任务书对不同形式的集聚（组团、强化、紧凑等）和分散发展都保持同样的开放态度，但学生的成果普遍都倾向于集中而非分散现有城市形态的主张。这可能会凸显一个主导性假设，即更趋向空间形态集聚的城市转型模式也更容易协调，并且也会像项目中的点状或线状策略展示的那样，能够更有效地服务于整体可持续性的概念目标 [44]④。尽管尚需深入研究以证实这些假设，但学术界的研究表现出了类似的对促进城市集聚的倾向，而这通常被称为“紧凑城市主义”，因为它在整个 21 世纪的城市实践中普遍流行 [45-48]。因此，这种倾向可以在设计课程中更为公开地提出，以积极引发更多关于集聚性利弊的讨论，而这也可以为进一步比对不同的形态学主题提供一个扎实的框架。

5 结论

最重要的是，本研究分析表明，棋盘博弈的游戏性和直觉性有助于帮助学生迅速逾越经典区域空间结构以中心和节点为主的局限。它还帮助学生克服了面对高度复杂的设计任务时典型的羞怯心理 [49]。棋盘博弈允许学生以一种快速即时的方式生成想法，与此同时保持对设计目标的重视，以作为一种正向改变的机制。因此，它创造了一个几乎是即时的反馈回路，其中的空间模拟不断刺激并引出新的空间模式，而这也鼓励参与者在项目演进的过程中不断评估和挑战自己的决定。虽然本研究尚未深入评估学生的个人体验，但通过学生小组在提交的成果中写下的反思，已经可以初步证实该学习经历对他们是有积极意义的。

在课程所设定的形态学主题的引导和鼓励下，学生们探索了区域内那些因循各自实际的空间功能构成而不断演变的差异性景观。传统的区域发展模式，例如中心地理论，仍然是影响中国空间规划的主导方法 [5]，而本研究阐述的形态学主题建立了一个可行的替代方案。那些只允许学生使用点状、线状或边缘状主题的任务书设定，会迫使他们不再重复一些可能更显而易见的空间策略，例如由发展走廊连接的一系列城市中心。

目前的方法论存在的一个重要缺陷是一些特定主题的项目缺乏空间的特异性。下一步需要探索如何突出有空间特异性的项目的重要性，从而产生实用且具有颠覆性的区域设计策略。限制主题的范围可能会帮助实现这一点，但也存在一定风险，因为这可能会“诱导”学生再一次去选择贴近传统的中心 - 走廊空间策略的形态学子主题的组合。无论如何，在此必须注意的是，棋盘博弈的一个关键特征是能够引入不同的利益相关者的博弈场景，包括争论以及解决不同的甚至相互冲突的设计与规划动态。这样的动态在设计课程中很难再现，因为课堂无法真实模拟现实生活的动态。因此，这里介绍的成果更多的是

基于分析支持而导向共识方案的空间形态。

综上所述，理大和代尔夫特持续 4 年的合作构建并迭代出了一种新的方法论，将城市学的各种专业能力整合在一个通过设计进行研究的创新教学方法中。城市理论、形态学分析、探索性棋盘博弈、城市设计和地理空间分析的相互交织与融合经常产生一些远远超越传统区域愿景和空间规划战略的提案。这些提案有的谨慎，有的激进，它们一同激发了关于大都市区发展的精彩讨论。

设计成果力求在整个区域现有的空间品质基础之上进行谨慎的转型，但在必要的地方也自信地提出了一些更为激进的空间干预措施。这是对中国巨型区域化的具体回应。即使经过 4 年的合作，这种充分运用棋盘博弈和区域设计的具体方法，无论是作为空间工具还是发展章程，都仍然没有得到充分利用。然而，这种空间成果对政策制定的参考价值结合现有的规划工具，仍然展现出新的机遇。考虑到这一点和其他方面的局限性，笔者准备继续深入发展棋盘博弈的方法论，以期进一步强化城市学教育，同时为中国大都市区区域设计的讨论及其潜在的问题做出贡献。

注释：

① 更确切地说，理大的课程是城市系统与策略（SD5707），而代尔夫特的课程为全球化: 城市影响研究（AR0400-401）。

② 每年课程使用的底图及其比例都会有些许差别，从而优化教学进程，例如将大城市圈的某些边缘地区加入或者剔除。

③ 附录 A 可从 OSID 下载查看。

④ 理大 2019 年课程的设计任务书是一个特例，学生被要求仅仅关注大湾区的非建成区域，而这一任务书的灵感来自 De Geyter 等在 2002 年进行的一个探索性研究（详见参考文献 [44]）。这一方法似乎引导学生提出了一些不寻常的空间主张，即城市化地区的分散设置。

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图表来源：

图 1 引自谷歌地球（2022 年），已经过笔者处理；图 2 由作者绘制；图 3~7© 学生名单（附录 B 可从 OSID 下载查看）；表 1 由作者绘制。

（编辑 / 王一兰）

Speculative Gameboarding for Megaregions: Using Morphological Themes for a Pedagogical Approach to Regional Design in the Greater Bay Area, China

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Since the 1990s, China is experiencing an unprecedented era of growth. Population, economy, and urban areas are growing at a speed and scale that has previously been unknown to the world[1]. Recent developments around the COVID-19 pandemic and the low birth rates of the country have brought some uncertainty to this trend, but China's economic strength and stable political system continue to drive massive transformations throughout society and space[2-4]. Within the country's planning system, megaregions — agglomerations that combine several centers of national and global importance — have gained particular importance as the strategic basing points of urban development[5]. Hence, dealing with China's unique form of urbanization remains a timely and urgent challenge, especially as it is exacerbated by the complexity of mega-regionalization. In this paper, particular interest falls on the spatial conditions of this context, and the possibilities to conceptualize future development at this scale.

Urbanism is a broad discipline that works at the core of spatial transformations across various scales. The discipline is known to consolidate methods from a variety of fields[6]. The same applies to regional design, a sub-discipline of urbanism that has since the 1900s (re-)gained popularity[7]. Regional design combines approaches from urban design, spatial planning, landscape planning, and environmental planning into a powerful tool to shape urbanization beyond traditional city cores with a specific, but not exclusive, focus on physical design. Furthermore, one of the core potentials of regional design is that it allows academics and practitioners "to think strategically about the future"[8]44 and thereby "challenge or enrich prevailing spatial concepts"[9]72. It is, therefore, a promising discipline with the potential to tackle a variety of urban challenges at a scale that matches the specific modes of planning in China.

This paper delves into speculative gameboarding as a methodology in the setting of academic planning and design studios, in order to explore alternative strategies for regional design in the context of mega-regionalization. Gameboarding describes a process of intuitively and playfully developing spatial strategies in a collaborative design setting[10]. The specific activities that the paper draws upon are design studios that were conducted in a four-year collaboration between The Hong Kong Polytechnic University (Hong Kong SAR, China) and the TU Delft (The Netherlands). Pedagogical settings are proven to be suitable testing grounds for new approaches to regional design and can stimulate holistic and disruptive thinking on urban-regional issues for participants from different disciplines[11-12]. Fewer insights exist regarding the quality of design outcomes that emerge from such settings. Therefore, this paper examines projects that were developed in connection to a variety of morphological themes. The focus lies on the quality and diversity of outcomes, which includes the potential to advance regional design strategies for megaregions in China. Before moving towards the methodology of this paper, the following section reviews the necessary

theoretical background, clarifying the issues of mega-regionalization as well as the need for "new" strategic approaches.

1 Background

1.1 Mega-Regionalization

Throughout the last 150 years, numerous terms try to conceptualize processes of urbanization on a regional scale. Dawkins[13] points out that regional development theory mostly emerged from the studies of economists in the late 19th century. A pioneering concept with a spatial focus that is more similar to the contemporary understanding of urbanism comes from Geddes[14] and his idea of urban conurbations. This is inspired by the observation that urban areas are increasingly expanding beyond the "dots"[14]30 that usually demarcate them on maps — forming ever-larger, continuous agglomerations. Similar observations lead Mumford[15] to the conceptualization of megalopolis, which is prominently picked up and advanced by Gottmann[16], who establishes the US East Coast (from Boston to Washington) as the prototype of regional urbanization in the 20th century. The rising influence of globalization since the 1970s urges further advancements of such concepts: highly influential research on world cities[17] and global cities[18] coins the idea of global city-regions[19] towards the end of the century. Today, a large variety of concepts — extended metropolitan region, exurban region, mega-urban region, super-region, metro region — has emerged to grasp shared notions of a widespread phenomenon: expanding regional fields of urban and economic concentration with strong internal and external linkages.

In the 21st century, the megaregion is increasingly popularized as a common term to describe novel forms of regional urbanization with strong links to the global economy[20]. Megaregions are used as a conceptual construct to measure the extent of megaregions in different parts of the world[21-22], but also as a means to promote institutional cooperation and coordinated forms of urban-regional development[5, 23-24]. For critical urban research, the focus on mega-regionalization allows for comprehensive investigations of urban transformation on multiple scales, taking into account both global forces and local specificities.

1.2 Planning and Designing Megaregions

Acknowledging mega-regionalization as a core constituent of contemporary urbanization may fundamentally challenge conventional approaches of planning and design. The traditional regulatory focus of spatial planning, as it is particularly used in Europe, tends to disregard the combination of functional and physical transformations as well as the duality of public- and private-sector ambitions that shape mega-regionalization[20, 25-26]. Regional design can offer a valuable alternative, as it is used to envision future developments with a concrete focus on physical transformations, shaped by both urban morphology and urban economics[9]. Moreover, iterative processes of analysis and projection make regional design a useful tool to combine insights from both public and private stakeholders[8]. Regional design, therefore, does not replace spatial planning, rather it complements it while also having the potential to challenge the unique issues posed by mega-regionalization.

Urban development frameworks in China emphasize regional planning and do not formally mention regional design. Nonetheless, strategic design thinking is commonly used in China's planning practice, which offers the potential to introduce regional design to deal with the uncertainties that come with the country's rapid urbanization[27]. Exploring such possibilities systematically may tackle a knowledge gap and advance the synergies of planning and design in China.

In order to fine-tune the contributions of regional design to planning debates in China, some related design approaches can be of use here. Speculative methodologies for large-scale transformations — as, for example, seen in the work of Chora[10] — point at more strategic approaches to deal with the uncertainty of megaregional development. Furthermore, the emergence of landscape urbanism[28] or delta urbanism[29] may shift the focus from planning for economic competitiveness and cohesion towards more holistic approaches that emphasize the importance of balancing urban expansion with socio-environmental concerns. Such approaches are also proven to be compatible with the core intentions of regional design, particularly in China[30-31]. The methodological approach presented in this paper has the ambition to exploit the enormous potential of these innovative and disruptive practices to chart new pathways of planning and designing megaregional landscapes.

2 Methodology

2.1 Research Aim

The brief theoretical review of the previous sections illustrates the tremendous challenges that are posed by contemporary forms of urbanization and mega-regionalization in China. Furthermore, it reveals the potentials of regional design to move beyond conventional forms of strategic spatial planning and urban design. Academic education of regional design serves as a suitable testing field for such approaches.

Accordingly, the design-research presented here explores alternative regional design strategies that acknowledge the diversity and complexity of urban landscapes in Chinese megaregions. This aim is pursued through two concrete objectives. The first objective is to assess different morphological themes that guide gameboarding strategies in a design studio setting to explore the spatial and biophysical process on how to adapt environmental regions through the production of a coherent spatial form. The second objective is to compare the different themes and thereby find redundancies, deficiencies — including emergent conditions — within the existing range of regional design strategies and their interrelated components. Both these objectives can

be realized through the outcomes of design studios that were conducted by the authors of this paper. These studios use the approaches mentioned above to harness the value of multi-scalar, systemic, and design-driven research.

2.2 Data Generation — The Design Studios

Between 2018 and 2021, a total of six design studios was conducted in a collaboration between The Hong Kong Polytechnic University's School of Design (PolyU) and the TU Delft's Department of Urbanism (TUD). The core aim of the studios is to develop speculative spatial strategies for the morphological development of the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) with a timeframe of approximately 50 years. The studios advance existing theory and pedagogical work on "design fantasies"[32] and the use of games for urban design and planning holistic and disruptive thinking on urban-regional issues[33]. Hence, they are well-aligned with the aim of this paper — in their use as both analytic and projective tools to explore alternative regional design strategies for Chinese megaregions.

The studios were part of the curriculum of the Master of Design in Urban Environments at PolyU and the Master of Science in Urbanism at TUD①. Running for eight weeks and ten weeks respectively, each studio had four to five groups of students, each with four to six group members. Student numbers in TUD studios were usually a bit larger than at PolyU. Studios included three phases — analysis, gameboarding, and evaluation — which will be shortly described hereafter. Of particular interest for this paper is the gameboarding phase.

The analysis phase of the studios is meant to familiarize students with the GBA and the initial formulation of problem statements. Analyses are performed on a 1 : 200,000 scale for the whole megaregion (Fig. 1)②. Identifying and emphasizing infrastructural networks, settlement patterns, and ecological dynamics, the students were encouraged to critically examine the megaregion, layer by layer, and thereby form a rationale to draft scenarios later on. The analysis phase occupies two to three weeks at PolyU and three to four weeks at TUD. At TUD, this phase was also preceded by a review of theoretical literature on urbanization in the context of metropolization and globalization.

The gameboarding phase is the decisive step to shift the process from description to propositions. Here, different groups of students are given different morphological themes. Using inexpensive materials such as colored paper, cardboard, yarn, pins, or stickers, the students intuitively and instantaneously "lay out" spatial strategies on the same scale that was used for the analysis in the first phase. Morphological themes such as strips, points, or rings encourage students to make confident and radical propositions on a very large scale. A key message to the students was to embrace "landscapes of difference", based on the assumption that territories as extensive as the GBA cannot be dealt with through simplistic patterns that aim to homogenize different urban landscapes[34]. Within the group, different roles could be taken in order to stimulate a debate that acknowledges the demands of different (potential) stakeholders. The gamification of the process is further augmented through visual rules that represent morphological transformations and, thereby, help to guide students towards comprehensive development principles. The gameboarding phase includes multiple iterations with groups discussions and design reviews. It occupies five to six weeks at PolyU and two to three weeks at TUD.

Lastly, the evaluation phase helps to assess the propositions of the second phase and can thereby lead to specific design and policy proposals as well as critical reflection on the proposed regional strategies. This phase has been more dynamic during the four years of collaboration and included more conventional urban design processes on smaller scales as well as simple forms of geospatial analysis. The evaluation phase occupies two weeks at PolyU and three to four weeks at TUD.

As it is shown here, the times allocated to the three project phases vary between institutions. The gameboarding phase, which is the main focus of this paper, spans six weeks in the PolyU setting and forms the core of the studio. The TUD studio harnesses gameboarding over three weeks, representing less than a third of the whole studio. That being said, the educational environment is presumably rather similar, as PolyU teaching staff regularly attended design critiques and presentations at TUD and vice versa. Nonetheless, the nuances between curricula and teaching approaches may have effects on the project outcomes, as it will be discussed later on.

2.3 Data Synthesis

This paper harnesses the outcomes of the design studios in order to draw conclusions on the suitability of different morphological themes and, more broadly, on the usefulness of gameboarding as a regional design strategy. Therefore, the analysis is conducted in two major steps. The first step is to assess the overall quality of the design outcomes with regard to their potential to advance regional design strategies. The second step is to synthesize and compare the outcomes of different morphological themes and thereby examine more specific differences between strategic approaches. Hence, this paper outlines interpretive research that uses qualitative methods such as content-analysis and meta-analysis to understand a given social reality[35]. The two main parts of this research are shortly presented hereafter.

To get an overview of the existing design work, the materials of all six studios are reviewed. Particular focus lies on the visual outcomes of the early gameboarding phase. This is where students are first introduced to the morphological themes, which means that this is also where the differences between themes can be seen most clearly. Projects are firstly compared along two major categories: spatial specificity and the radicalness of interventions. The latter is related to the aim of this paper to find alternative approaches for regional design, which may respond to the massive

transformations occurring in megaregions, either by carefully expanding on existing qualities or by radically restructuring given conditions. The former category — spatial specificity — is related to the potential of regional design to merge the strategic directives of spatial planning with the physical specificity of urban design[7, 36]. Marrying strategic thinking with specific morphological expressions on a regional scale is considered to substantially advance regional design and its contribution to wider debates on sustainable urbanism.

Following a general comparison of the projects within these categories, projects are clustered and compared with regard to their morphological themes. Here, similarities in the outcomes of different themes are examined in order to assess their usefulness. The initial step is to see how a specific theme has "scored" within the categories. Subsequently, the projects are scanned for potential consolidations based on redundancies between themes and promising gaps for further inquiry. Rather than trying to expose deficiencies, it seems more useful for this phase to be conducted as a search for best practice examples, because this helps to emphasize approaches that seem promising and may therefore be used for upcoming iterations of this method.

3 Design Outcomes

This section presents the results of the analysis. It starts with a short profile of the GBA, which was the main geographical focus of all design studios. The remainder of the section presents the design outcomes of the studios and compares and evaluates them according to the methodology.

3.1 The Guangdong-Hong Kong-Macao Greater Bay Area

Together with the Jing-Jin-Ji megaregion around Beijing, and the Yangtze River Delta megaregion around Shanghai, the GBA is one of China's three "giant megaregions"[22][1]. It is located in the south of China, encompassing nine cities — Guangzhou, Shenzhen, Foshan, Zhongshan, Dongguan, Zhuhai, Jiangmen, Zhaoqing, and Huizhou — and two special administrative regions(SAR) — Hong Kong and Macao. On an area of approximately 56,000 km^2, population estimates range between 60 and 90 million people[37]. The megaregion contributes 12% to China's total GDP — making its economic output similar to that of Canada[38]. The GBA includes various Special Economic Zones, Free Trade Zones, and other policy mechanisms that make it one of China's strongest and most globalized economies[39]. Both the population and economy of the GBA are expected to keep growing during the coming decades.

At least since China's 12th Five-Year Plan, published in 2011, the GBA's special importance is recognized and heavily supported on a national scale[5]. Simultaneously, the ways in which the rapid growth of the GBA conflicts with the natural system of the Pearl River Delta and the region's volatile weather conditions pose a massive ecological risk that may severely affect economic development[40]. The enormous social, economic, and environmental relevance of the GBA makes it a prime example to investigate contemporary processes of mega-regionalization.

The GBA basemap that was given to students in the 2021 studios (Fig. 1), does not include the entirety of the GBA's administrative extent, but rather focuses on the most urbanized parts at the core of the megaregion. Accordingly, it ends at the eastern edge of Shenzhen and the western edge of Foshan and Guangzhou. Similar basemaps were given to students in previous years, since this delineation has proven to lead to an appropriate level of detail in the analysis and gameboarding phase. Most groups used a DIN A0 print-out of this map, which equals a scale of 1 : 180,000. In the studios that were conducted online, smaller versions of the map may have been used. Next to the aerial image, different layers such as built-up areas, roads, rail, and different classifications of non-built-up areas were used. Hereafter, it is examined how different design outcomes are projected onto these basemaps.

3.2 Eight Morphological Themes

A total of 25 projects were created during the six design studios. Within these projects, eight different morphological themes were covered: radial, ring, pointillist, strip, linear, megablock, cross, and edge (Tab. 1). Each of these themes entails a morphological expression that is used to spatially conceptualize and speculate on the GBA's urban landscape. Short explanations of the themes were provided in each studio. Pointillist strategies, for instance, comprehend the urban landscape as a grid that can be programmed through fine-grained nuances of developmental types and functional nodes. Alternatively, strip strategies propose compositions of shorter spatial lines forming larger corridors, and thereby using the close adjacency of diversely programmed strips to challenge the current center-periphery model. For detailed descriptions of all themes, the reader is referred to Appendix A③, or earlier work by the authors[41-42]. The themes that were covered at the highest frequency were the pointillist strategies and the strip strategies — each with six related projects. The themes with the lowest frequency were the radial strategies and the ring strategies, which were abandoned after the first studio at PolyU in 2018. The themes cross and edge were only introduced in the 2021 studios, which is why there are only two projects for each of them. Considering these frequencies, the themes that can be assessed adequately by themselves are pointillist, strip, linear, and megablock, each with at least three projects. Due to their limited frequency, the other four themes are mainly used as exemplary projects to add to the overall impression.

3.3 Analysis I — Assessment

As proposed in the methodology section, the design outcomes are firstly assessed with regards to their spatial specificity as well as the radicalness of their proposed transformations. Spatial specificity is herein defined as the degree

to which the visual representation of the project represents the characteristics of the given urban landscape. This may be achieved through a fine grain of individual elements, high diversity in types of visual elements, or a high level of detail in the shape of individual elements. The radicalness of transformations is defined here as the difference between the proposed regional morphology and the existing situation. Proposing minor functional changes to a limited number of areas is considered to be a careful transformation. Proposing entirely new and extensive spaces to expand or reduce built-up space is considered to be a radical transformation.

Fig. 2 shows a visual distribution of the 25 projects along these two axes. Being located in the upper half of the graph means that a project may be more suitable to make a substantial contribution to advance regional design strategies. However, being located in the top-right quadrant of the graph — spatially specific and radical — does not necessarily mean that a project is "better". The subjective categorization presented hereafter is mostly a tool to stimulate further discussion, rather than a final judgement.

Major observations to be made from the initial categorization are that projects tend to be rather low in spatial specificity, and rather radical in their proposed transformations. The highest number of projects (11) is found in the bottom-right quadrant of the graph — low spatial specificity and radical transformations. Distribution in the other three quadrants is roughly equal. Roughly two-thirds of the projects (16) are in the lower half of the graph — less spatially specific. The lowest number of projects (4) is in the top-right quadrant of the graph — the one that combines high spatial specificity with radical transformations. More extensive quantitative interpretations of this categorization would defeat the purpose of this paper to conduct qualitative research. Therefore, further interpretations of the findings will be presented in the following sections of this paper.

3.4 Analysis II — Comparison

According to the objectives presented earlier, the remaining step of this analysis is to compare the different themes to identify their overlaps and gaps. Here, the limited group of themes with significant sample numbers is examined — pointillist, strip, linear, megablock. The other four themes are then used to further clarify the first round of comparison.

With further reflection on Fig. 2, the most careful transformations are proposed in projects that use pointillist strategies. The most radical propositions come from linear and strip strategies. Less spatially specific propositions result from pointillist and strip strategies. Especially megablock projects are difficult to position here because the three related projects are spread across three different quadrants. Accordingly, some consolidation of the different themes might be useful. Moreover, further investigation of the projects themselves could help to acknowledge more individual differences.

Looking at the totality of final gameboarding iterations (Fig. 3-7), several observations can be made. First, there are significant overlaps between the themes pointillist and megablock. Pointillist strategies tend to work with pins and other circular shapes, but also with squares that have a high similarity with those commonly used in the megablock strategies. For instance, the pointillist clusters proposed in PolyU '21 are very similar to the megablock clusters proposed by PolyU '19 or TUD '19. This suggests that the strategy of identifying and expanding on existing megablock structures in the GBA[43] may be difficult to implement on a megaregional scale, as it mainly leads groups towards proposing centralized nodes with surrounding clusters. Hence, as important as the phenomenon of megablocks is to understand urban development in the GBA, its suitability as a morphological theme for gameboarding on this scale may be questionable. Instead, it may be more useful to integrate the acknowledgement of megablocks into the pointillist strategy, and thereby use the simplicity of points to develop nuanced strategies of nodes and clusters on different scales.

Another potential for consolidating themes lies between the linear strategy and the strip strategy. In the 2019 studios, where both themes were used, some crossovers can be observed. For instance, the linear strategy TUD '19 uses the adjacent composition of functional concentrations that is originally thought to be a key quality of the strip theme. Similarly, the linear strategy PolyU '19 uses short overlapping lines of urban compositions that — in their totality — strongly resemble the quality of strips to exploit multi-functionality through the co-location of rather monofunctional zones. Hence, it could be efficient to consolidate linear and strip strategies into one linear theme, which actively encourages both corridors and strip developments.

The two morphological themes that were introduced most recently — cross and edge — provide opportunities to be consolidated with previous themes, and thereby enrich the range of "pointy" and linear strategies. The cross strategy shows clear tendencies to establish nodes of concentration, especially in PolyU '21. TUD '21 shows some more variation regarding the axes extending from the center of the crosses, but the main focus still seems to be on the creation of systems that privilege individual centers. Edge strategies, on the other hand, seem to introduce some of the strict linearity that the linear theme itself fails to deliver. Especially the edge strategy in PolyU '21 manages to articulate interventions along built-up/ non-built-up transition zones that show a high variety of functions while distinguishing itself from a strip composition. The edge strategy in TUD '21 achieves a similar effect by strategizing along zig-zag delineations. Therefore, the cross and the edge strategies are valuable additions to the existing range of themes — as far as their early tests show.

Radial and ring are difficult to position in the sum of projects. Further samples would be needed

for both themes, especially on the scale of the GBA. From the existing projects (PolyU '18) it can be argued that the ring strategy has a rather linear orientation, while the radial strategy has a rather nodal orientation — as the basic geometry behind these two themes would suggest.

In addition to differences between morphological themes, variances between projects from PolyU and TUD are evident. A key difference to be observed here is that PolyU projects tend to propose more radical transformations: while nine out of 13 PolyU projects are positioned in the more radical half of Figure 2, TUD projects are equally distributed between careful and radical transformations. A possible explanation for this is that students at TUD spend more time on the analysis phase, which may emphasize an evidence-based understanding of the space that limits their "courage" to be imaginative and explorative. Simultaneously, the majority of students at PolyU comes from Mainland China, which gives them a more personal familiarity with the region that supports a more intuitive entry into the gameboarding phase. Such experiences are reflected in personal interactions with the students, and occasionally in the submissions themselves. For instance, one of the groups in TUD '20 describes the gameboarding phase rather generally as an "eye-opening experiment", thereby positioning it as a valuable but somewhat external element in their process. In contrast, PolyU groups refer more specifically to their themes as "morphological strategies" or even over-state their theme as the foundation of a fundamental paradigm shift — e.g. from the strip as a strategy towards envisioning a "strip city" (Fig. 4).

To conclude this analysis, the hypothesis is that various consolidations of the themes could be beneficial for upcoming iterations of the gameboarding methodology. Two main themes can be proposed: pointillist strategies, including variations such as megablocks, crosses, and star-like radials; and linear strategies, including variations such as strips, edges, and rings. An issue with the consolidation of point strategies is that they seem to have a lower spatial specificity: the themes pointillist, megablock, and cross score significantly lower than linear, strip, and edge. Hence, the briefs for the pointillist theme — or possible sub-themes — may have to be adapted in future gameboarding activities. Together, the two steps of analysis presented in this chapter provide comprehensive insights into the potentials and deficiencies of speculative gameboarding in general and different morphological themes in particular. The following two sections summarize these insights and formulate outlooks for further action.

4 Discussion

The first part of the analysis in this paper (section 3.3) shows that there is a great variety of approaches to be found in the 25 projects, but that there is room for improvement regarding the spatial specificity of the proposals. Even without investigating the conceptual intentions behind the individual projects in detail, it is obvious that they show a wide range of propositions for spatial distribution and functional diversification — along with impressive creativity in terms of morphological expressions. However, despite this inspiring diversity, several projects miss the spatial specificity that characterizes the core potential of regional design. Particularly for "pointy" themes, explorations are needed on how to strategize a theme based on the spatial arrangement of nodes without diagrammatizing it in a way that resembles conventional polycentric planning models[7, 9]. Variations of themes and briefs could help with this. The hypothesis formulated in this paper can be a first step.

As described in the previous section, the main hypothesis that can be deducted from this paper is to consolidate all morphological themes into two overarching themes — points and lines. This would give students some more flexibility to choose between different variations of regional morphologies and may stimulate the emergence of new themes that the teaching staff did not come up with yet. Limitations could then be introduced through other means, such as thematic propositions regarding values. Particularly in TUD studios, projects often formulate very holistic conceptual visions along the triple-bottom-line of sustainability — everything is supposed to be ecological and equal while preserving economic strength. While this is a commendable goal, it occasionally leads to generic propositions that have difficulties in grounding their visions in workable interventions. The phenomena of the values behind morphological expressions may be worth further exploration.

Another interesting issue for further research would be the strive for urban concentration that can be found in most projects. While the briefs are equally open to different forms of both concentration (clustering, intensification, compaction, etc.) and dispersion, student work generally shows a tendency to concentrate rather than disperse existing morphologies. This may render visible a dominant assumption that urban transformations leading towards stronger morphological concentration are easier to coordinate and, like in the cases of concentric or linear strategies, able to more effectively serve the conceptual goals of holistic sustainability[44] ④. Although further inquiry is needed to confirm such assumptions, academic research similarly shows gravitation towards urban concentration — often called "compact urbanism" — as it is prevalent throughout urban practice in the 21st century[45-48]. Accordingly, this preference could be addressed more openly in the design studios in order to actively initiate discussions on the pros and cons of concentration. This would also provide a solid framework to make further comparisons between morphological themes.

5 Conclusion

Most importantly, the analysis in this paper

shows that the playful and intuitive character of gameboarding helps to rapidly look beyond classic regional structures of centers and nodes. It helps students to overcome the shyness that is typical for students that are confronted with highly complex design tasks[49]. Gameboarding allows students to generate ideas in an immediate manner while keeping emphasis on the purpose of design as a mechanism for propositioning positive change. Hence, it creates an almost instant feedback loop in which simulation produces constant stimulation towards novel spatial patterns, encouraging participants to constantly assess and challenge their own decisions in an evolutionary process. While an in-depth evaluation of the students' personal experiences is yet to be made, initial impressions confirm this positive learning experience through group reflections written in the submissions.

The morphological themes postulated in the studios have encouraged students to explore landscapes of difference that evolve, based on their actual spatio-functional compositions. This builds a valid alternative to traditional models of regional development such as the central place theory, which is still a dominant approach in Chinese planning[5]. Briefs that limit students to only using points, lines, or edges force them to divert from presumably more obvious strategies, such as urban centers connected by corridors.

A critical deficiency of the current methodology is the lack of spatial specificity that was observed in some of the projects and in relation to some particular themes. Possibilities to emphasize the importance of spatially specific projects is a significant aspect to further explore in order to lead to useful and disruptive regional design strategies. Limiting the range of themes may support this, but may also bear the risk of "tricking" students into using combinations of morphological sub-themes that are — once more — closer to conventional center-corridor strategies. Either way, it is important to note here that a key modality of gameboarding is to enable different stakeholder scenarios, including contestation and resolution of different — and at times conflicting — design and planning dynamics. Such dynamics are difficult to reproduce in a design studio, as it lacks the simulation of real-life dynamics. Therefore, the work presented here is based more on the analytical underpinnings and the morphologies that support consensual resolutions.

In conclusion, four years of collaboration between PolyU and TUD have constructed and iterated a new methodology that bundles various competencies of urbanism into an innovative research-by-design pedagogy. The combination of urban theory, morphological analysis, speculative gameboarding, urban design, and geospatial analysis has led to propositions that regularly point far beyond conventional regional visions and spatial planning strategies. Combinations of careful and radical proposals have stimulated fascinating discussions on megaregional development.

The design outcomes strive for transformations that carefully build upon existing spatial qualities found across the territory, but also confidently impose radical interventions where needed. This is a specific response to mega-regionalization in China. Still, with four years of collaboration, the definitive approach that fully embraces gameboarding and regional design remains underutilized as both a spatial tool and a developmental protocol. The relevance of such spatial outcomes for policy and existing planning instruments exposes an opportunity. With this and other limitations in mind, the authors intend to further develop the gameboarding methodology and, thereby, aim to further excel education in urbanism while concomitantly contributing to both the debate and latent problems of megaregional design in China.

Notes:

① More specifically, the studio at PolyU is the module "Urban Systems and Strategies" (SD5707), and the studio at TUD is the course "Globalisation: Research on the Urban Impact" (AR0400-401).

② Scales and basemaps were slightly adapted throughout the years in order to optimize the process, e.g. to include and exclude certain parts at the edges of the megaregion. See Figure 1 for an example.

③ Appendix A may download from OSID.

④ An exception is the brief for the projects in PolyU '19, which focused on propositions that exclusively deal with the non-built-up areas of the GBA — inspired by the speculative research of De Geyter et al. (see reference [44]). This approach seems to have guided students towards some rather unusual approaches that propose distributed fields of urbanization.

Sources of Figures and Table:

Fig.1 source: Google Earth (2022), edited by authors; Fig. 2 source: authors; Fig. 3-7 © list of students (Appendix B may download from OSID); Tab. 1 © authors.

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