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Human Agency, Network Dynamics and Regional Development: The Behavioural Principles of New Path Creation

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Abstract

New path creation processes are a vital component of regional economic development. This paper establishes a behavioural framework to examine and understand such processes. It is argued that human agency and the network dynamics through which these agents interact are at the heart of new path creation processes. In particular, effective new path creation requires the formation of collective forms of agency based on strong strategic networks underpinned by a shared commitment. Regions that are equipped with such agency and networks are more likely to be capable of embracing and managing the economic complexity and adaptability necessary to generate the innovation associated with new development paths.

Introduction

Recent advances in regional development theory have begun to provide a more comprehensive understanding of the complexities of the process of such development (Hassink et al., 2019). Stemming from the emerging field of evolutionary economic geography, there is a growing acknowledgement that positive regional development outcomes are based on the creation of new industrial paths that are able to foster and nurture both economic and social development (Grillitsch, 2019; MacKinnon et al., 2019; Frangenheim et al., 2020). Alongside the requirement for the creation of new development paths, there is a growing field of study that has made significant progress in understanding the role of different forms of agency and agent in facilitating this new path creation and regional development (Grillitsch and Sotarauta, 2020; Huggins and Thompson, 2021). This represents a novel, welcome and necessary accompaniment to the more advanced structural-based theorisations and analyses of regional development focused on the nature of industrial and economic organisation.

The notion of agency as a key concept within regional development frameworks naturally leads to questions concerning the behavioural factors underpinning agency that impact upon development trajectories. In recent years, significant advances in the fields of regional studies and economic geography have started to theorise on different conceptualisations and forms of human agency that may foster regional development. For example, Bækkelund (2021) seeks to differentiate the nature of transformative ‘change agency’ from the ‘reproductive agency’ that stems from the embedded institutions within regions. This is important given that the nature of agentic behaviour concerning regional development will impact on the types of paths this development will follow. In particular, new path creation processes are likely to differ from the reformation of existing paths due to the likelihood of a diversity of change agents seeking to promote interests that may not be

harmonious across these agents (Breul et al., 2021). Furthermore, this range of interests may result in intentions that individual agents will seek to enact over differing time frames. This suggests that the temporality of intentions is related to the types of agency that regional development stakeholders pursue. Furthermore, Grillitsch et al. (2021) find that transformative change agency, as opposed to reproductive agency, is based on a long-term perspective which gives agents the capacity – at least temporally – to mould and change capabilities and institutions, especially those related to network dynamics.

Against this backdrop, and building upon contemporary contributions to the field (e.g. Carvalho and Vale, 2018; Hassink et al., 2019; Grillitsch and Sotarauta, 2020; Jolly et al., 2020; Baumgartinger-Seiringer et al., 2021), this paper seeks to further existing conceptualisations and theories of agency, network dynamics and regional development. The objective is to extend the above advances and understandings by critically analysing and integrating elements of the relevant literature from evolutionary economic geography, the emerging field of behavioural economic geography, as well as literature addressing concepts from the fields of social network theory, complexity economics and entrepreneurship theory. Fundamentally, this approach seeks to better understand the extent to which regional economic evolution is a function of both individual and collective human behaviour. The approach adopted aims to build a theoretically comprehensive perspective of the nature of regional economic evolution. It seeks to address these behavioural factors through an examination of the interdependency of the agency and network dynamics that either facilitate or hinder new path creation across regions.

More specifically, it aims to address the dimensions relating to the *potential* for, and the *formation* and *actualisation* of, new economic development paths in the regional context. We use the term ‘dimension’, in contrast to ‘phase’ or ‘stage’, to reflect the non-linearities and feedback loops that are characteristics of both an evolutionary and behavioural process based on the potential, formation and actualisation elements of new regional path creation. In particular, it seeks to build on the work of scholars such as Sydow et al. (2012) – at the organisational level – and Holmen and Fosse (2017) and Baumgartinger-Seiringer et al. (2021) – at the regional level – who consider the pre-formation, formation and lock-in phases of path development. In order to focus specifically on the agency and structure of new path creation the ‘potential-formation-actualisation’ framework provides a conceptual fit with theories related to the evolution of human agency and the behavioural aspects of networks and systems within and across regions (Bristow and Healy, 2014; Powell et al., 2013).

The aims and objectives outlined above lead to a number of research questions that motivate the analysis: (1) How do differences in human behaviour impact on the creation of new regional development paths?; (2) Which types of human agency and network dynamics promote or limit the formation of new development paths?; and (3) How can lagging regions seek to effectively establish new development paths? This final research question is crucial as the framework presented in the paper provides a means for regions and their policymakers to begin to better understand where they possess hidden human behavioural strengths. Identifying and understanding these strengths will enable policymakers to better exploit them as part of economic development efforts, or alternatively where weaknesses and gaps exist and attempt to address them. To achieve this, the paper establishes a number of behavioural principles of new path creation that are explored and integrated so as to present a framework concerning the nature of human agency and the structures formed through network dynamics that either facilitate or constrain new path creation. The term ‘principle’ is employed as it refers to fundamental assumptions relating to behaviour, and in this case it seeks to capture the human behavioural elements of new path creation.

The paper contends that new path potential is a function of the role of human agency and the social networks within which this agency operates, with these factors being the

fundamental behavioural building blocks that regulate path development. Underpinned by regional cultural and psychological factors, the scope for new path potential is considered to relate to agentic issues concerning the nature and availability of transformative, dissonant, and open behaviour. Structurally, networks that are open, inclusive, flat and equitable, as well as providing access to a wide range of ‘opportunity spaces’ (Grillitsch and Sotarauta, 2020), are argued to determine new path potential. New path formation is framed by issues of collective agency and the types of strategic networks that facilitate, or hinder, the emergence of new development paths. In particular, it addresses the logics upon which these networks are based, as well as the distribution of power and leadership. New path actualisation is conceptualised as referring to the capacity to realise the complex adaptive systems upon which transformative development paths are based. Within these systems the nature of innovating agents is proposed to play a significant role in determining new path creation and associated outcomes.

The paper begins by briefly setting the scene by over-viewing issues of agency and network dynamics in the context of regional path development, before moving on to the core sections outlining our propositions concerning new path potential, formation and actualisation. The paper concludes by considering the proposition that new development paths in lagging regions are likely to emerge ‘against all odds’ and to assess if there is a more optimistic way of addressing the future development trajectories of these regions.

Network Dynamics, Agency and Regional Development Paths

In order to consider the relationship between structure and agency, and their roles in development processes, there have been calls within strands of the economic geography literature for the need to better understand the role of ‘microprocesses’ on ‘macrostructures’ within regions, as well as the impact of macrostructures on these microprocesses (MacKinnon et al., 2009). From a structural perspective, regional economies can be considered to operate as systems that possess a varying degree of complexity and adaptability, with these systems being composed of a series of networks that determine development paths and subsequently outcomes (Martin and Sunley, 2007). These outcomes are manifest in economic terms by the competitiveness and resilience of these regions (Huggins and Thompson, 2017; Bristow and Healy, 2014). Furthermore, the systems governing these development paths are multi-dimensional and shape factors relating to economic growth, innovation and entrepreneurial capacity (Martin and Sunley, 2007; Bristow and Healy, 2015; Roundy et al., 2019).

Such systems also shape and are shaped by the underlying behaviour of agents within each region, and are ontologically multi-level incorporating the behaviour of firms and organisations coupled with the behaviour of human agents (Hwang and Colyvas, 2019). Given this, these systems function through networks at the interpersonal, inter-firm and inter-organisational level, which themselves are governed by social, economic and political institutions (MacKinnon et al., 2019). This is an important aspect to note whereby networks should not be conflated with systems within the new path creation process. Networks are a component, and clearly a key one, that moderate the structure and function of these systems.

In general, network dynamics, in terms of their formation and evolution, have long been acknowledged as playing a key role in mobilising diverse individual agency to establish a more collective agency that has underlined the processes of new path creation in leading high-tech regions (Powell et al., 2013). In these cases, network formation and evolution lead to the increasing technological complexity of these regional economies, which ultimately allows them to grow faster than their counterparts (Mewes and Broekel, 2021). From the perspective of new path creation in lagging and peripheral regions, these network dynamics are equally important; and Grillitsch and Hansen (2019), for example, find that a key barrier

to new path creation in these regions is related to issues of network failure in terms of the dynamics of ties both structurally and spatially.

Addressing network failure forms part of the challenge to create change in the institutional environment and arrangements in lagging regions (Rodríguez-Pose and Ketterer, 2020). In such regions it is all too often the case that the types of change agent who could stimulate institutional reform have migrated to other regions with stronger ecosystems and greater opportunities, or that the underlying behavioural traits of the region have meant that such agency has not been nurtured in the first instance (Huggins and Thompson, 2021). This situation leaves these regions in a position whereby they lack a critical mass in the types of industries and sectors that ensure value, with new development paths being limited and constrained (Frangenheim et al., 2020).

Fundamentally, regional institutions interact with the underlying behavioural traits present in each region, which ultimately determines the formation of the types of human agency enacted, either individually or collectively, within these respective regions (Huggins and Thompson, 2021). Such relationships and interactions drive the networks underpinning the socio-economic systems within regions. The growing acknowledgement of the role of this behavioural aspect is consistent with recent advances in institutional theory concerning the micro-level processes stemming from the social psychological traits of agents (Zucker and Schilke, 2019). Therefore, from a behavioural perspective regional development paths emerge from the relationships between the socio-economic systems within a region, the network dynamics governing these systems, and the behavioural traits of human agents within each region. These system level elements are both the results of, and result from, the forms of agency present in a region and the networks through which these agents operate. It is these primary factors that ultimately determine patterns of new path creation or path dependency.

As indicated above, the complex nature of these relationships and interactions are both multi-dimensional and multi-level and can be configured and analysed in numerous ways. However, from the point of view of new path development a fundamental issue concerns the role of human agency in relation to the innovation systems, entrepreneurial ecosystems and the like that catalyse new development paths (Bristow and Healy, 2014). This resonates with the original notions of evolutionary economic thinking whereby the nature of these systems is rooted in behavioural factors and changes in such behaviour (Nelson and Winter, 1982). In order to begin to unpack the nature of agency within regional development processes, especially the behavioural principles of new path creation, it is instructive to theorise as to how and where different forms of human agency and the structures stemming from network dynamics either facilitate or hinder new path creation within regions, especially economically less developed regions.

New Path Potential

This section argues that the nature and sources of human behaviour and agency within a region are the fundamental building blocks underlying the potential to establish new development paths. The roots of behavioural and agentic differences across regions are determined by factors such as socio-spatial culture and personality psychology, which underlie the intention to behave in a particular manner (Huggins and Thompson, 2021). In this sense, human behaviour refers to the general behaviour of all people living and working in a particular region. These behaviours are known to be conditioned by the interdependency of the personality traits of these individuals and the socio-spatial cultural environment in which they are embedded (Fischer, 2017). In the case of this study, human agency – or agentic behaviour - refers to the intentional actions of particular individuals or collectives of individuals that play a potential role in shaping the economic development and evolution of

their region. Therefore, their personality traits and the cultural environments in which they are embedded are likely to matter.

Indeed, human agency is a primary driver associated with regional economic development, with innovation, entrepreneurship, and creativity being social processes that involve groups of people who build off one another historically, and are the products of regions that act as the key organising unit for these activities, bringing together the firms, talent and other regional institutions necessary to support entrepreneurship (Florida et al., 2017). Therefore, behaviour and agency based on a rationality that is often spatially bounded through the prevailing forms of culture, personality psychology and institutions is likely to impact on the potential for new path creation (Huggins et al., 2021).

As Hassink et al. (2019) argue, new path creation and development through the emergence and growth of new industries and economic activities can ontologically be related to two broad categories of agency: one that operates within firms and organisations; and another that operates across systems such as those found in regions. At a micro-level both firm/organisational and system categories are populated by connected human agents that share particular expectations and values, i.e. their behavioural profile. Transformative agents may be actors from across a region and include those with both formal and informal positions of authority (Beer et al., 2019; Sotarauta, 2016), but a key component of their behavioural traits is the ability to offer the leadership required to catalyse change (Sotarauta et al., 2012; Sotarauta and Beer, 2017). Transformative processes consist of the microevolution of new path creation based on existing human agency and their interactions through existing regional socio-economic systems (Gong and Hassink, 2019; Grillitsch and Sotarauta, 2020).

In terms of particular forms of behaviour, a strong and significant positive relationship between levels of behaviour that can be considered extravert and economic development across regions has been found (Huggins and Thompson, 2021). Similarly, the geography of personality traits with regard to rates of extravert–introvert behaviour is strongly associated with economic performance and innovation. This suggests that having people with the ‘right’ personality in a region may be an important influence on new path creation potential. Outwardly facing behaviour tends to foster greater economic resilience, which suggests the possibility that some regions possess the ‘wrong’ type of behaviour – if not, the wrong culture – when it comes to catalysing innovation, economic development and new path creation. Therefore, while the configuration and capability of regional socio-economic systems determine regional development outcomes at the micro-level, it is the role of certain key human agents within regions who actually shape the nature and evolution of these systems (Huggins and Thompson, 2021). This allows our first behavioural principle of path creation to be established:

Principle 1a: New path potential in regions will be based on the nature of key human agents within these regions and the socio-economic systems in which they are situated.

Grillitsch and Sotarauta (2020) suggest that the interplay existing between and across path-dependent structural forces and opportunity construction and utilisation through agentic processes is at the heart of new path development and creation. This clearly points to the behaviour of agents as a central dimension feature of new path potential. However, it leads to the question: which agents matter? Grillitsch and Sotarauta (2020) suggest that three types of agency are likely to be the most relevant for driving regional structural change: Schumpeterian innovative entrepreneurship; institutional entrepreneurship; and place-based leadership. The outcomes from this agency rest on the micro-level interplay between them within an ‘opportunity space’, which can be interpreted as a mediating factor between agentic change and structural change initially through network evolution (Grillitsch and Sotarauta,

2020). Indeed, these opportunity spaces can be considered to be a forerunner of the spaces required to forge the collective agency that facilitates new path formation.

Clearly, the role and activities of particular forms and types of agency will vary during different periods and parts of the new path creation process (Jolly et al., 2020). In particular, the capacity to establish dissonance and transformative agency is likely to be related to the extent to which incumbent agents, be they at a human or firm level, are reliant on a region's established capabilities and resource base, with less reliant agents having a greater propensity to induce structural change (Neffke et al., 2019).

Given the importance of openness and diversity, there is an implication that regions may not just benefit from having greater diverse and extravert behaviour per se, but in the way this diversity and extraversion also allows the flourishing of other forms of behaviour through greater tolerance (Florida, 2002). As Stark (2009) suggests, a sense of what he terms 'dissonance' is likely to result in a diversity of value-frames that generate new combinations of resources. Through these combinations regional economic transformation may emerge from the forms of agency that promote institutional and cultural change, especially through the introduction of economically efficient institutions, as well as cultural change and diversity across time. Regions that are unable to effectively transform economically and industrially may be marked by agents that promote institutional and cultural persistence, in particular through rent-seeking institutions, as well as cultural reproduction and homophily (Huggins and Thompson, 2021). Therefore, the second behavioural principle of new path creation can be stated as:

Principle 1b: Regions with significant new path potential will have a high degree of behaviour manifested by transformative agency, a tolerance for behavioural dissonance, openness and diversity.

Importantly, the agency of actors within a region will be a function of their existing position within pre-existing networks. Although agents with a central position in these networks may have the behavioural traits required to facilitate new path formation, others may have traits that are more likely to produce negative lock-in effects, suggesting a darker side to both structure and agency within certain regions (Grillitsch, 2019). These networks will include social networks built upon kinship and friendship as well as business and economic networks stemming from sustained economic relations and institutional interactions (Storper, 2018; Gong and Hassink, 2019). Social network theory and analysis indicates that many of the most advanced regions around the globe have relatively flat and open (equal) social networks with regard to developmental factors (Semlinger, 2008). In contrast, those in lagging regions tend towards a hierarchical (unequal) nature and are populated by a very limited number of agents operating within their networks. Furthermore, engagement in these networks tends to be linked to the underlying personality traits of agents (Burt, 2012), which means that as more developed regions usually have greater numbers of agents possessing an 'openness' to their behaviour, they are more likely to have flatter, inclusive and equitable networks that aid processes of transformation and new path creation, as stated by behavioural principle 1c:

Principle 1c: Regions with significant new path potential will possess a range of opportunity spaces accompanied by social networks that are open and inclusive as well being flat and equitable.

In summary, the potential to create new regional development paths is embedded in the interaction between the underlying forms of behaviour and agency of people within a region and the social network structure within which these people develop interpersonal

relationships. Figure 1 presents a stylised summary of the likely differences across regions with either significant or limited new path potential. From an agentic perspective differences in the level of agency with the potential to be of a transformative nature are clearly an important element of behavioural change capacity. However, this is also coupled with the capability of the region as a whole to tolerate the type of behaviour that is perceived as dissonant and to create ‘waves’ that go against the psychocultural grain within the region.

Figure 1 About Here

Within this framework, open and diverse behaviour is likely to be fostered to a greater extent in regions with significant new path potential, compared to the more closed and less diverse behavioural and cultural traits found in regions with limited new path potential. From a structural perspective, social networks form the main determinant of new path potential, and regions will vary in terms of the way in which these social networks provide a wider or narrower range of the types of opportunity spaces identified by Grillitsch and Sotarauta (2020). Similarly, regions with significant path potential will have more open and inclusive networks that embrace the types of transformative agency and dissonance identified above. Finally, such networks will necessarily be flatter and more equitable in terms of their power distribution compared with the more unequal and hierarchical networks found in regions with less potential.

An instructive example of peripheral regions with significant new path potential are the areas of Toggenburg and Rhine Valley in Switzerland, with both building on behavioural characteristics that have acted as an important feature for stimulating regional development (Bürcher, 2017). In particular, an economic history embedded with strong social networks across family firms, as well as interaction with the community, has facilitated a process of regional engagement encompassing all aspects of new path development, which allowed new industry related to high-tech manufacturing to grow (*Principle 1c*). In the United States, Roundy (2019) analyses the case of the previously failing city of Warren in Ohio, whereby a number of transformative entrepreneurs have developed new networks and opportunity spaces that have allowed a ‘recrafting of the city’s narrative’ to encompass a new diverse range of businesses within the city (*Principle 1b*). Although at a relatively nascent stage of new path creation, Roundy (2019) indicates that a new openness and diversity of behaviour is sowing the seeds for the establishment of a more sustained entrepreneurial ecosystem.

In Sweden, the evolution of the region of Ljusdal from an economy dominated by the forestry industry to a centre for business services has been attributed by Nuur and Laestadius (2010) to the ‘horizontal dynamics’ and networks that were capitalised upon at the genesis of the road to new path creation. As Nuur and Laestadius (2010) indicate, the pre-formation phase was largely an organic process based on existing structures and agents outside of the public sector, with the formation stage encompassing public sector investments leading to more strategically directed approaches to a growing call centre industry. Furthermore, Isaksen and Trippel (2017) highlight the process by which the peripheral region of Arendal–Grimstad in Southeastern Norway began a process of new path development connected to the agency and networks associated with two pioneer firms in the electronics industry (*Principle 1a*). Despite being a lagging region, existing agents provided the basis for new path potential processes that ultimately led to the regeneration of the regional economy.

New Path Formation

This section proposes that the formation of new development paths is a function of the nature, sources and evolution of collective agency, as well as the role of effectual and causal network logics in the establishment of this agency. In this respect, collective agency and the networks

it fosters becomes the structure of new path formation processes. In particular, it is argued that in order to avoid ‘path exhaustion’ and to stimulate routes to new path formation, it is factors such as collective human agency that go beyond skills and firm-level capabilities that actually determine the future fortunes of a region (Isaksen and Trippel, 2016; Carvalho and Vale, 2018). Collective agency necessarily involves multi-scalar networks with increasingly complex logics and governance processes, with agentic and structural forces interacting more closely as new path development moves from a position of potential to formation (Bristow and Healy, 2014; Kurikka and Grillitsch, 2020). Given this, power necessarily plays a central role in the process of collective agency formation, with new and evolving networks of relationships between individual agents and activities emerging together. These may take the form, for example, of new economic development fora and stakeholder networks ranging from regional development advisory groups, cluster groups, or investment groups, with each agent having their own vested interests and power bases (Coleman and Agnew, 2018).

In this respect it is informative to consider processes of new path formation, especially network evolution, from the opposing logics of causation and effectuation. Pioneering research in the field of entrepreneurship by Sarasvathy (2001) has identified individual behaviour, in particular that of entrepreneurs, as being rooted in one of two different logics. These consist of either a ‘causation logic’ whereby individuals plan their desired objectives (‘ends’) while defining the necessary ‘means’ required, or an ‘effectuation’ logic whereby individual enact behaviour that defines (and redefines) their desired ends as they become more aware and knowledgeable as to what realistic ends can actually be achieved with their existing means (Sarasvathy, 2001; Kaufmann, 2013). In essence, processes based on causal logics relate to “a particular effect as given and focus on selecting between means to create that effect”, while effectual processes take “a set of means as given and focus on selecting between possible effects that can be created with that set of means” (Sarasvathy, 2001: 245).

This emerging strand of research is particularly relevant to new path formation in the regional context, especially from the perspective of the adoption of network behaviour that has either an effectual or causal logic, with the nature of interactions between agents influencing an individual’s choice of logic (Kerr and Coviello, 2020). In other words, not only do individuals bring their own behavioural logic to the collective table, but the interactions of the collective table also feedback on their initial behavioural logic. This is an important argument partly because it leads to questions as to which voices are heard, where does power and influence lie around these tables, how can conflicts that jeopardise the formation of collective agency be alleviated through network brokerage. It also informs the extent to which networked collective agency either empowers or constrains personal agency or the organisational level agency for whom engaged individuals represent. The importance of these feedbacks from interactions are captured by behavioural principle 2a:

Principle 2a: The capacity for new path formation in regions will be based on the nature of the collective agency and behavioural logics within key strategic networks in these regions.

A key argument of the causal-effectual logic dichotomy is that effectual behaviour is of particular value in entrepreneurial settings due to these contexts tending to have no clear development path (Sarasvathy, 2001). Clearly, this may impact on new path formation at the regional level, with networks designed to produce collective agency likely to include a mix of individuals inclined to behaviour that is either effectual or causal in its rooted logics, with both potentially having value.

Behavioural differences and attitudes to risk are important in the context of regions in terms of perceptions of the future, which will be related to the capacity and capability to

generate collective agency. For example, members of regional strategy fora representing a government or public policy body may be inclined toward behaviour with a causal logic, based on a belief that the future tends to be predictable and controllable, and therefore robust plans can be designed to address this future. Conversely, individuals representing business and entrepreneurial communities may be inclined to an effectual logic based on a belief that the future is more unpredictable and uncontrollable, and therefore less able to plan for effectively. In reality these differences are unlikely to be as discrete, but nevertheless they are likely to impact upon policies designed to induce new path creation. Kaufmann (2013), for example, argues that the causation logic is commonly adopted in cases whereby policymakers attempt to clone the success of other countries and regions.

In general, the nature of networks and the collective agency formed by regional stakeholders will be based, at least initially, on the behavioural logics of these stakeholders in terms of their inclination towards either an effectual or causal logic. However, the inclusiveness of the 'collective mind' may be advanced more effectively under effectuation than causation, particularly as network dynamics based on effectuation may involve a greater degree of trust and social mechanisms (Kerr and Coviello, 2020).

These differing mechanisms and types of network agents play an important role in new path formation. They indicate that network behaviour relating to the micro-foundations of network evolution (particularly the formation of network ties across agents) and network micro-dynamics (especially homophily, heterophily and attraction to prominent others), as well as proximity, helps us better understand why some efforts to catalyse new path creation across regions are likely to be more successful and effective than others (Kerr and Coviello, 2019). Indeed, these micro-foundations and micro-dynamics are an underlying force and precursor for the types of complex adaptive systems discussed below are a key aspect of the actualisation of new path creation.

Within entrepreneurial settings networks based on an effectual logic tend to be congruent with the nature of complex adaptive systems, whereby such systems consist of groups of semi-autonomous agents who interact with each other in interdependent ways producing patterns that influence the behaviour of agents (Dooley, 1996; Galkina and Atkova, 2020). Entrepreneurial human agents interacting within networks are interdependent individuals or groups, with their constant interactions generating patterns of behaviour that grow into sustained system-wide elements producing nonlinear, emergent dynamics and generate creativity, learning, and adaptability, i.e. the acknowledged elements of complex adaptive systems (Galkina and Atkova, 2020). Of course, while this may be the case for entrepreneur-only based networks, within the types of multi-agent networks seeking new path formation, effectual and causal logics are likely to be at play in a non-mutually exclusive manner. Therefore, it is the combination and interaction of these behavioural logics that will determine the degree of complexity and adaptability of system-wide elements, which in turn impact on the capability to actualise efforts to form new regional development paths.

From this perspective, there are strengths and weaknesses to both effectual and causal approaches to network building, with effectual behaviour promoting networks constituting agents who are more likely to be accessible and willing to support the policy approach, rather than a causal behaviour that strategically cultivates key agents and activates perceived important network ties (Sarasvathy and Dew, 2005; Prashantham et al., 2019). Either way, it is the failure to catalyse networks of collective agency that are likely to result in Sotarauta's (2016) metaphorical concept of policy 'black holes', whereby regions tend repeat the superficial successes of the past rather than establish systemic change (Nieth et al., 2018).

The above suggests that dualisms such as the structure-agency formulation are somewhat limited as means of progressing policy due to the complex dynamics of collective behaviour (Granovetter, 2017). The emergence of joint commitment, collective agency, and

the shared values required for new path formation stems from the more nuanced notion that aggregated and associational human behaviour results from ‘fused egos’ (Bratman, 1993; Gilbert, 2009, 2014). Such behavioural fusion, as indicated by behavioural principle 2b, is at the root of the collective intentionality that is a long-term predictor of development (Searle, 1995). Clearly, a lack of collective intentionality due to power tensions, such as between the state and civil society, hinders new path development, which is apparent not only across nations as a whole but within particular regions (Jones et al., 2013; Acemoglu and Robinson, 2017).

Principle 2b: Regions capable of generating significant new path formation will have the capacity to harness behaviour based on collective agency, fused egos and distributed power.

Figure 2 provides a summary of the arguments made above, indicating that the capacity of regions to form new development paths will vary in terms of a number of factors relating to the agency of actors engaged in regional development efforts and the structuring of the networks within which these agents organise themselves. It is interesting to highlight that regions with significant potential require a degree of dissonance to stimulate new ideas and activities, but within the formation dimension these ideas and activities are required to be harnessed through collective agency. Therefore, those regions with significant new path formation capacity are able to fuse the individual egos of often high profile regional agents and to ensure power is distributed across the types of strategic networks that are empowered to establish new path formation.

Principle 2c: Regions capable of generating significant new path formation will possess strong strategic networks of shared commitment based on a balance of effectual and causal logics as well as strong leadership and distributed power.

Figure 2 About Here

In some ways, these strategic networks act as the emergent structure for the complex adaptive systems that are at the centre of the actualisation of new development paths. A good example of a highly peripheral and lagging region that has started to establish the strategic networks and collective behaviour allowing the formation of new development paths is the transformation of North East Romania. As Healy (2016) outlines, this severely economically challenged region voluntarily embarked upon a process of developing a regional innovation strategy. This process of strategy development was widely embraced by relevant agents and actors who grasped the opportunity to be collectively involved (*Principle 2a*). This formed the basis of an ongoing networked learning exercise, whereby those involved sought to forge new paths for their organisations and support the transformation of the local economy. This has significantly promoted entrepreneurship and cluster development across the region.

A further example of the formation of new development paths in a peripheral region is the evolution of La Pocatière in Canada. Previously it was largely an agricultural region but over time it has transformed to a region with a significant manufacturing sector based on engineering technology and transport. Doloreux and Dionne’s (2008) account of innovation system development in the region highlights the emergence of networked activities centred around a common desire to initiate new business activities based on the community’s strength. In particular, these networks are focused on a collective approach to accessing new markets for the emerging industries in the region. Potter and Lawton Smith’s (2019) examination of the process of smart specialisation through entrepreneurship in Poland’s less developed regions of Pomorskie and Malopolskie also point to building strategic networks

across all relevant stakeholders (*Principle 2b*). This approach not only sought to identify industries and economic activities with potential but also to address the innovation required to establish new development paths (*Principle 2c*). In all three cases there is evidence of a fusing of egos in a bid to collectively and strategically form new development paths despite the relatively hostile economic environment in which agents are operating.

New Path Actualisation

In the preceding sections of this paper we have sought to argue that both from a structural and agentic perspective it is necessary to consider the behavioural antecedents of system actualisation in terms of issues of potentiality and formation. This section focuses on the process of new path actualisation, and the nature of agency and structure, in the form of the complex adaptive systems that are the means by which the innovation required for new path creation is realised.

These systems are a manifestation of the role of human agents – principally, but not exclusively, entrepreneurs – and their interdependent behaviour in multi-scale networks that either forge or constrain innovation and new path creation. The majority of regions will possess some form of this complexity and adaptability but crucially it is the degree of both that will determine the actualisation of new path creation and related innovation. Economically advanced regions are likely to have a relatively high density of active agents generating a complexity of interactions compared with less advanced and more peripheral regions.

More generally, Martin and Sunley (2011) argue that the evolution of regional economies can be best analysed by considering them to be manifestations of complex adaptive systems consisting of numerous components with functions and interrelationships that provide these systems with a particular identity and a high degree of connectedness. Furthermore the adaptive perspective highlights the importance of the recombination and reuse of resources. Renewal, they argue, depends on reworking the legacies from preceding economic cycles, particularly through the engagement of ‘extrovert’ entrepreneurs. Martin and Sunley (2011) further suggest that the micro-behaviours - or agency - of individual system components (individuals and firms) are the most significant factor for evolutionary courses during periods of change and transition:

Principle 3a: The capability of a region to actualise the process of new path creation is inherently related to the behaviour of agents that are key components within emerging complex adaptive systems.

The flourishing field of ‘complexity economics’ has begun to shift schools of economic thought from a distinction between what has long been labelled as the disciplines of ‘micro-economics’ and ‘macro-economics’ to a more integrated view of the dynamics of the economy based on modelling individual agency and the networks within which these agents interact (Beinhocker, 2006; Martin and Sunley, 2007). Building on this, contributions in the fields of economic geography and regional studies are seeking to integrate the fundamental concepts of complexity theory – such as emergence, self-organisation and adaptation – to further our understanding as to how regional economic landscapes evolve, especially with regard to innovation and new path creation (Cooke, 2012; Martin and Sunley, 2007).

Key generic properties of complex adaptive systems are: highly distributed and open connectivity across components; non-linear dynamics resulting from complex feedback and self-reinforcing interactions; a primacy for emergence, self-organisation and adaptive behaviour; and non-tractable and non-deterministic behaviour (Martin and Sunley, 2007). More advanced regions tend to develop socio-economic systems within which macro-level

behaviours emerge from and also influence the micro-level interactions of the elements of these systems, which facilitate the creation of new order. i.e. emergence (Roundy et al., 2019). This can take the form of the creation of new development paths, which are the resultant actualisation of the agentic and structural properties of the potential and formation parts of the overall process. A key aspect of the actualisation of new paths concerns the non-linear dynamics operating within systems, with the higher the degree of complexity and adaptability the greater will be the level of non-linear dynamics within the structure. Fundamentally, and as behavioural principle 3b highlights, the greater the degree of complexity, the number of potential development paths multiplies as does the number of potential outcomes for actualising these paths:

Principle 3b: Regions capable of actualising new path creation will possess economic systems with a high degree of complexity and adaptability, with highly distributed and open structures that are able to generate multiple development paths.

New path actualisation processes represent the realisation and creation of regional development routes based on innovation. As illustrated by Figure 3, these processes and routes are embedded within a structure based on regional economic systems with a certain degree of complexity and adaptability. Regions that are the best places to actualise new development paths will be those with the highest degree of complexity and adaptability, with highly distributed and open system configurations. Conversely, regions with limited capacity to realise new development paths will have an economic system containing less of the traits that are considered to represent complex adaptive systems, with systems that are more closed and concentrated.

Figure 3 About Here

Within regions with significant new path development capacity there are likely to be a higher degree of active agents within systems. Furthermore, the nature of innovation agents within regions may differ, with better positioned regions having a greater proportion of the types of ‘fast’ innovators characterised by Shearmur and Doloreux (2016), compared to a larger proportion of ‘slow’ innovators in regions that are less able to realise new development paths. Furthermore, regions with the most significant new path actualisation capacity will possess a greater proportion of agents, both human and organisational, that are able to effectively tolerate the complexities and non-linearity of innovation-driven economic development. As behavioural principle 3c sets out, such tolerance refers to having significant agents with the behavioural traits required to manage and negotiate the complexity of the development process.

Principle 3c: Regions capable of actualising new path creation will have a high degree of active and fast innovating agents with a tolerance for complexity and non-linearity.

This principle suggests that the odds of actualising new development paths will be in favour of those regions that show more economic resiliency over time. These regions are in pole position to embrace the non-linearity of the complex adaptive systems that create the multiple development paths underpinning the capability to achieve multiple development outcomes (Frangenheim et al., 2020). However, there are numerous examples whereby lagging and peripheral regions have undertaken a process of actualising new path creation. One example is the emergence of a winter automotive-testing cluster in the peripheral areas of Arjeplog and Arvidsjaur in Sweden. This has changed the region from a contracting economic

environment to becoming a world-leading node of the global automotive industry and transforming itself into one of Sweden's highest earning regions (Arbuthnott and von Friedrichs, 2013). In this example, a number of key local entrepreneurs led the emergence of new networks both locally and internationally (*Principle 3a*), which rapidly improved the complexity, adaptability and openness of the local economy (*Principle 3b*), resulting in significant and sustained innovation (Arbuthnott and von Friedrichs, 2013).

Carvalho and Vale (2018) analyse new path creation in the lagging Portuguese Centro Region, which has recently established itself as a significant location for the biotechnology industry. Previously, the region had little capacity in the sector, but building upon existing assets a small number of active agents - university professors, science park directors, the mayor, start-up founders - forged new connections across distributed resources (*Principle 3a*). This established an actively constructed ecosystem that has encouraged investment and the establishment of a new cadre of start-ups.

Furthermore, the peripheral region of Mühlviertel in Upper Austria has established itself as a software complex through the agency of public and private sector actors, which have built an ecosystem with significant capacity to absorb and exploit knowledge for innovation, as suggested by *Principle 3c* (Isaksen and Trippl, 2017). The new paths created have been based on novel combinations of knowledge, support for new firm formation, and a long-term commitment by regional policy actors.

Conclusion: Regional Development 'Against All Odds'?

This paper has sought to tease out and elucidate some of the behavioural principles relating to new regional path creation as a means of providing a better understanding of the process of regional economic evolution. This has been undertaken by conceptualising path creation through an examination of agentic and structural factors stemming from network dynamics relating to path potential, formation and actualisation. The following are the main findings stemming from the analysis: (1) the potential for new path creation in a region is a function of the nature of key agents, especially those with a high degree of transformative agency rooted in a tolerance for behavioural dissonance, openness and diversity, and who are situated within social networks that are open, inclusive, flat and equitable; (2) the capacity for new regional path formation is a function of the collective agency formed by regional strategic networks based on distributed power, shared commitment, a balance of effectual and causal logics, underpinned by strong leadership; and (3) the capability of a region to actualise new path creation is a function of the degree to which it is able to embrace and strategically manage the complexity and adaptability required to generate the innovation associated with new development path processes.

In summary, it is found that for each path creation dimension, the factors facilitating or constraining such creation relate to the nature of particular agents within the networks that structure efforts to realise economic development. Therefore, the requirement for various complex agentic and structural dimensions to be in place suggests that it is a tall order for the majority of lagging and uncompetitive regions across the globe to 'beat the odds' and successfully enter new phases of economic growth and development. Indeed, this is substantiated by much of the comparative analysis of regional development over the first two decades of the 21st century indicating a more uneven and divergent economic landscape across regions (Iammarino et al., 2019; Kemeny and Storper, 2020).

This increasing divergence has rightly led to a growing literature on the economic evolution of lagging and left behind regions. In particular the role of agency, especially human agency, has started to be recognised as a potentially key component and lever for promoting new path creation alongside already acknowledged structural factors. This paper establishes a framework whereby the micro-processes of new path creation can be better

understood from the perspective of the individual and collective behaviour of those engaged in economic development in weak regions. This approach starts to suggest that the delineation of structure from agency is rather artificial when addressed from a network behaviour view on new path creation.

Institutional views of regional development have clearly shown that there is a need to consider the efficiency and appropriateness of the regulatory framework, both formal and informal, as part of regional economic development strategising. This is a significant step forward but this paper suggests that the next part of the puzzle to be solved is how particular agents either promote or limit the formation of effective institutional arrangements, especially the networks through which economic development is enacted. Similarly, there is a requirement to analyse, in tandem, how network dynamics moderate the nature and types of agents who are able to engage in new path creation processes.

The paper has highlighted a number of positive examples whereby particular forms of behaviour by key agents has led to new network formation at various points of along the path creation process. In particular, successes have often been based on the establishment of the types of strategic networks, in the form of the regional development consortia and fora, allowing new and enduring modes of collective agency, power sharing and leadership that are undoubtedly prerequisites for effective new path formation. To this extent, research has indicated that connecting to power can be a significant means by which agents, especially entrepreneurs, can access the resources to innovate and subsequently stimulate new development paths (Akcigit et al., 2017; Bussolo et al., 2018). In lagging regions promoting such an approach will require strong place leadership, and it is clear that place leadership requires balanced insights into both the agency of individuals and more collective structures such as networks (Sotarauta and Beer, 2017). If anything, the analysis presented in the paper raises the bar higher. It indicates that effective leadership may come from a range of diffuse sources that need to be harnessed to form a true collective force in a highly complex environment. Leaders in strong places have many advantages in this respect as they can positively build on the network dynamics of the past. In weaker regions, leaders are likely to have to work harder to build the diffuse networks required for catalysing and embedding new path creation processes.

Given these findings, perhaps the most fundamental, but often overlooked, challenge relating to new regional path development is to harness the personal agency and intentions of, for example, entrepreneurially-minded individuals in lagging regions. Joint commitment across the collection of agents capable of impacting upon economic development is vital, with a likely requirement for a balance of both effectual and causal network logics. In leading regions there is often a relatively strong alignment between personal and collective intentions and agency, at least with regards to economic development outcomes. In economically weaker regions, the relationship between personal and collective agency is more likely to operate in counter directions that work against aggregate levels of development (Huggins and Thompson, 2021). However, this needs to be researched in a more systematic manner, particularly through detailed comparative case studies. This paper starts to hint that from a policy perspective there is a stronger requirement for regional leaders and decision-makers in lagging regions to have a better understanding of the type and mix of agents, networks and systems that are needed to promote new path creation. These continue to represent considerable challenges given the likelihood of significant lock-in on many levels, but without effectively addressing these factors even new institutions are unlikely to overcome embedded behavioural bottlenecks.

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Figure 1: Agency, Network Dynamics and New Path Potential

	Regions with Significant New Path Potential	Regions with Limited New Path Potential
Agency	<ul style="list-style-type: none"> • High degree of behaviour with transformative agency. • Tolerance of a degree of behavioural dissonance. • High degree of open and diverse behaviour. 	<ul style="list-style-type: none"> • Low degree of behaviour with transformative agency. • Low tolerance for dissonant behaviour. • More closed and less diverse behaviour.
Network Dynamics	<ul style="list-style-type: none"> • Wide range of ‘opportunity spaces’. • Open and inclusive social networks. • Flat and equitable social networks. 	<ul style="list-style-type: none"> • Narrow range of ‘opportunity spaces’. • More closed and exclusive social networks. • More hierarchical and less equitable social networks.

Figure 2: Agency, Network Dynamics and New Path Formation

	Regions with Significant New Path Formation	Regions with Limited New Path Formation
Agency	<ul style="list-style-type: none"> • High degree of behaviour with collective agency. • High degree of behaviour based on fused egos. • High degree of behaviour based on distributed power. 	<ul style="list-style-type: none"> • Low degree of behaviour based on collective agency. • High degree of behaviour based on individual egos. • High degree of behaviour based on concentrated power.
Network Dynamics	<ul style="list-style-type: none"> • Strong strategic networks based on shared commitment. • Strategic networks based on a balance of effectual and causal logics. • Strategic networks based on strong leadership and distributed power. 	<ul style="list-style-type: none"> • Relatively weak strategic networks and a lack of shared commitment. • Strategic networks based on a bias toward causal logics. • Relatively weak strategic network leadership and a concentration of power.

Figure 3: Agency, Network Dynamics and New Path Actualisation

	Regions with Significant New Path Actualisation	Regions with Limited New Path Actualisation
Agency	<ul style="list-style-type: none"> • High degree of active agents within (complex adaptive) economic systems. • High degree of ‘fast’ innovating agents. • Tolerance for complexity and non-linearity 	<ul style="list-style-type: none"> • Low degree of active agents within (complex adaptive) economic systems. • Higher degree of ‘slow’ innovating agents. • Lack of tolerance for complexity and non-linearity.
Network Dynamics	<ul style="list-style-type: none"> • High degree of complexity and adaptability within economic systems. • Highly distributed and open economic systems. • Multiple development paths leading to options for multiple outcomes. 	<ul style="list-style-type: none"> • Low degree of complexity and adaptability within economic systems. • More concentrated and closed economic systems. • Limited development paths leading to limited options for outcomes.