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Analyzing Beliefs and Coordination in Nascent Policy Subsystems

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Introduction

Now and then, new issues arrive on the public agenda, such as a sudden health crisis or a disruptive technology. These issues get media attention, and the political actors start thinking about how to best address them. Following the Advocacy Coalition Framework (ACF), such situations can be grasped through the concept of nascent subsystems, which contrast with mature subsystems that have been around for some time and that

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deal with established issues. Over time, nascent subsystems can develop into autonomous subsystems, or they can be absorbed by an already mature subsystem. From ACF literature, it is largely unclear how actors organize, interact, and agree in nascent subsystems, probably because their policy beliefs are not yet well established when dealing with a new issue. In consequence, patterns of coordination and strategic behavior are crucial. Actors in a nascent subsystem are likely to behave differently than the ACF would predict for actors in a mature subsystem, thus potentially affecting our understanding of policy-making processes and policy change. Against this background, we ask: What belief system structures and coordination patterns are typical for political actors involved in a nascent policy subsystem?

Answering our research question provides insights into broader questions on how political actors react to a new issue emerging on the political agenda, how they organize in the early stage of collective action, and how they try to influence the designing of policies. In a first step, we deduce three indicators for identifying nascent subsystems: a new (framing of an) issue on the agenda, no policy dealing with this issue, and no clear jurisdiction or geographical boundary wherein this issue is dealt with. We argue that subsystem maturity is not necessarily a question of the age of the subsystem or the amount of time a given issue has been dealt with, but a question of degree (Lemke et al., 2023). In a second step, we formulate a set of hypotheses on how actors would behave in nascent subsystems. We assess if expectations about belief coherence as well as coordination patterns, deduced from ACF hypotheses formulated for mature subsystems, also hold true in nascent situations. In a third step, we rely on empirical data from three Swiss cases (unconventional gas, food waste regulation, and antimicrobial resistance) and analyze the fragmentation and coherence of actors' belief systems, as well as the relation between coordination patterns and belief systems. Keeping the larger institutional setting of Switzerland constant but investigating different policy issues should give insights about both generally valid and subsystem-specific patterns of how nascent subsystems differ from mature ones. In a fourth step, we link the results back to the emerging literature on nascent subsystems and the ACF.

Knowing more about nascent subsystems is important for many reasons. First, situations of nascent subsystems are frequent in a highly dynamic societal context with rapid technological developments and

multiple systemic crises that continuously bring new issues onto the political agenda. Second, knowing more about nascent subsystems is crucial if we want to understand policy change happening through coalition change due to external events or cross- or inter-coalitional learning. However, in a nascent context, there might be no clearly established coalitions, affecting our understanding of inter-coalitional negotiation and learning and, thus, of how policy change is made related to new issues on the political agenda. Third, this chapter also reflects about the methodological approach to choose when studying nascent subsystems (more or less explorative, deductive, or inductive), depending on the empirical "circumstances" (e.g., geographical boundary clear or not), data availability (e.g., no clear set of actors dealing with the issue, no clear secondary aspects formulated by any official document, etc.), and data structure (e.g., unstable clustering of actors, low model fit, etc.).

Finally, we argue that knowing more about nascent subsystems also has practical implications: Many issues that found their way on the political agenda are finally never addressed, or the policies addressing these issues are perceived as insufficient or malfunctioning by many actors. The reason for this is very often political stalemate and conflict lines between competing actors and coalitions (see, e.g., the phenomenon of the devil shift; Fischer et al., 2016; Sabatier et al., 1987). Knowing more about when and how coalitions form around a new issue also helps in understanding and preventing such conflict. Furthermore, important milestones might be set in terms of potential policy solutions but also in terms of new venues or coordination patterns already at the nascent stage of a subsystem.

Setting Boundaries of (Nascent) Subsystems

Following the ACF, "the policy subsystem is the primary unit of analysis for understanding policy processes" (Jenkins-Smith et al., 2018, p. 139). The constitutive elements of a policy subsystem are a topical area, a territorial scope, and a configuration of actors interested in the topical area, who join advocacy coalitions and try to influence policy outputs. These three elements define the *boundaries* of a policy subsystem and support the empirical application of the ACF. However, these boundaries are not well defined when a new issue arrives on the political agenda (Beverwijk et al., 2008; Lemke et al., 2023; Sabatier & Brasher, 1993; see also table in the online appendix). Nascent subsystems are characterized by one

or several issue-specific actor networks, "little history of policy solutions or outputs, little advocacy activity, and little public and decision-making attention" (see table in online appendix; Beverwijk et al., 2008; Ingold et al., 2017; Sabatier & Jenkins-Smith, 1999; Strich, 2015; Zafonte & Sabatier, 2004).

The literature has suggested different ways how nascent subsystems appear. In early work, Sabatier and Brasher (1993) as well as Sabatier and Jenkins-Smith (1993) mainly emphasized two "*inside* dynamics." On the one hand, a nascent subsystem can be a spin-off of a mature one because some actors are dissatisfied with some of the issue aspects being continuously and deliberately kept out of the political agenda by the hegemonic majority of actors in the mature subsystem. These minoritized actors try to develop their own subsystem for dealing with the "neglected" aspects of an issue. On the other hand, policy issues might be re-conceptualized or perceived differently by all subsystem actors. Sabatier and Jenkins-Smith (1993) expect in the first, the "spin-off" situation, differentiated coalitions that mirror the pre-existing groups, and in the second situation more fragmented beliefs and unstable coalitions. Beverwijk et al. (2008) apply these theoretical ideas to show that the emergence of the education policy subsystem in Mozambique is a case where an issue is re-conceptualized. Stritch (2015) provides a similar study when studying greater reporting and disclosure requirements that are imposed on trade unions through Bill C-377 in Canada (see table in the online appendix).

Recent literature about nascent subsystems focuses on the "*outside* dynamics" of a subsystem when a new issue arrives "from outside" of the political agenda (Lemke et al., 2023; Wiedemann & Ingold, 2023). There are two expectations on what could happen in terms of subsystems: On the one hand, if the issue is absorbed by a pre-existing subsystem, coalition structures are mirrored from the mature subsystem. On the other hand, if the issue produces its own subsystem, fragmented belief systems and "coalitions of convenience" or "ephemeral coalitions" are expected to emerge (Ingold et al., 2017).

Besides the appearance of a new issue on the agenda due to inside or outside dynamics, further indicators for a nascent subsystem are the absence of a policy solution (in terms of subsystem output[1]) to the perceived problem (Lemke et al., 2023) and the absence of knowledge in what jurisdiction or at what decisional level to tackle the issue (Wiedemann & Ingold 2023). These three mechanisms are not independent of each other (see Table 1). A new issue in a nascent subsystem

Table 1 Boundary definition in nascent versus mature subsystems

Indicators	Nascent subsystem	Mature subsystem
New issue on the political agenda	Dissatisfaction with issue framing by some subsystem actors Re-conceptualization of existing issue New issue arriving from "outside"	Agenda-setting process largely controlled by advocacy coalitions and subsystem actors
Subsystem outputs	No outputs yet (or very new but single output; see Fidelman et al., 2015)	Outputs and experience with minor or major policy changes
Responsibilities to tackle the issue	Not clear yet at what jurisdictional level or in what territory to regulate the issue	Clear geographical area and responsibilities and competences assigned (can also be multi-level or supra-national)

is not yet regulated, and no policy output has been introduced. In a situation when a new issue arrives "from outside" of the agenda, the concrete jurisdictional level where to tackle it is not yet clear. Furthermore, jurisdictional levels can also be re-defined in cases of dissatisfaction or re-conceptualization.

Expectations About Beliefs and Coordination in Nascent Subsystems

The ACF claims that a subsystem should be observed for at least one decade or more to understand or explain coalition formation and maintenance, policy learning, and policy change (Nohrstedt et al., 2023). Most empirical studies focus on mature subsystems and the policy changes therein (Nohrstedt et al., 2023; Pierce et al., 2017). The few studies of nascent subsystems (Ingold et al., 2017; Lemke et al., 2023; Stritch, 2015; Wiedemann & Ingold, 2023) conclude that some of the key assumptions of the ACF cannot be confirmed for nascent subsystems. In what follows, we first outline some key ACF assumptions and hypotheses as developed for mature subsystems. We then review the existing literature on nascent subsystems and summarize the findings of that literature with respect to the previously identified ACF hypotheses. We then propose

which hypotheses of the ACF can be tested in nascent subsystems or how they can be amended to fit with the nascent subsystem situation.

Beliefs and Coordination

The ACF presents a three-tiered belief system (Henry et al., 2022; Sabatier & Jenkins-Smith, 1993) and states that core beliefs are more stable and, thus, more decisive for coalition building and maintenance than secondary aspects. This idea is outlined in the ACF coalition hypothesis 2 (Nohrstedt et al., 2023; Sabatier & Jenkins-Smith, 1993), as well as in the belief homophily hypothesis (Gronow et al., 2022; Ingold & Fischer, 2014). The first states that "actors within an advocacy coalition will show substantial consensus on issues pertaining to the policy core, although less so on secondary aspects." The second assumes that "actors with similar policy beliefs tend to collaborate."

The literature includes some hints about differences between a nascent and a mature subsystem regarding policy core and secondary beliefs and their hierarchy. First, authors agree that in nascent subsystems, beliefs are more fluid and fragmented (Sabatier & Brasher, 1993). When studying the relationship between belief levels, this instability of beliefs over time is likely less pronounced with respect to policy core beliefs than secondary aspects (see also Gronow et al., this book). Consequently, in nascent subsystems, it is not clear whether and how groups of like-minded actors will build an advocacy coalition (Stritch, 2015; Wiedemann & Ingold, 2023). Belief congruence is more difficult to assess in nascent subsystems because there is not much knowledge about the beliefs themselves, and even less so for secondary aspects (Lemke et al., 2023; Wiedemann & Ingold, 2023). It is easier to identify policy core beliefs than secondary aspects in a nascent subsystem (and subsequently consensus among actors about them) because policy core beliefs are (1) more generally formulated and (2) "copyable" from other neighboring or similar mature subsystems (Gronow et al., this book). This uncertainty of assessing different types of beliefs also holds for political actors involved in a subsystem, as they only become experts of subsystem issues and policy solutions over time (Ingold et al., 2017). Therefore, the longer that actors are members of a subsystem, the more they can create a coherence between their core and secondary beliefs as well as the beliefs of their coalition peers.

In conclusion, we expect that:

Expectation 1: The belief systems of actors in nascent subsystems are fluid, fragmented, and incoherent.

More concretely, Expectation 1 materializes in the following sub-elements of cluster overlap, coherence, and consensus:

E1a: An actor in a nascent subsystem only displays a limited coherence between its policy core beliefs and its preferences for secondary aspects (**actor's belief coherence**).
E1b: Actors that agree upon policy core beliefs do not necessarily agree also on secondary aspects, and vice versa (**belief cluster consensus**).

In the ACF, the two key dimensions of beliefs and coordination do not operate independently of one another, as coordination within advocacy coalitions is hypothesized to be driven by shared beliefs (see also Pfeiffer et al. this book). The belief homophily hypothesis suggests that individual actors tend to choose coordination partners with probability proportional to the similarity in belief between themselves and potential partners (Gronow et al., 2022; Kammerer et al., 2021; Satoh et al., 2021). There is broad empirical support for this hypothesis in the literature on the ACF and policy networks (Calanni et al., 2015; Henry, 2011; Ingold & Fischer, 2014).

However, in nascent subsystems, belief systems tend to be not well articulated and are unstable over time (see Expectations, above). This makes it more difficult for actors to find like-minded others and to start coordinating with them. Given this difficulty, previous studies of nascent subsystems identify a wide set of other factors, besides joint beliefs, that impact actors' coordination and coalition formation (Jenkins-Smith et al., 2018, p. 149). Examples are actors sharing similar opponents versus trust in allies (Henry et al., 2011; Ingold et al., 2017; Stritch, 2015) or material self-interests and resources endowment of coalition partners (Matti & Sandström, 2011; Nohrstedt, 2011). Triangulating this with the hierarchy of beliefs, we expect that:

Expectation 2: Coordination among actors in nascent subsystems does not follow a clear belief-induced pattern.

More concretely, Expectation 2 materializes in the following two sub-elements of actors' coordination:

E2a: Secondary aspects can shape the coordination patterns among actors at least as much as policy core beliefs (**belief hierarchy for within-cluster coordination**).
E2b: Actors' coordination across belief clusters can be at least as strong as within-belief clusters (**across-cluster coordination**).

CASE AND METHODS

We analyze three nascent subsystems: unconventional oil and gas regulation in the canton of Neuchâtel, and food waste regulation and antimicrobial resistance (AMR) policy at the national level in Switzerland. Two of the three issues have arrived newly on the agenda ("outside dynamics"): hydraulic fracturing—also called fracking—for the extraction of unconventional oil and gas, and food waste. AMR was regulated under the water protection act and ordinance but in an insufficient manner in the view of some actors; this is why AMR is a case where we could witness dissatisfaction with the original framing of the issue ("inside dynamics"). In all three cases, there are no, or only preliminary, policy outputs, such as a moratorium (temporal ban) on fracking, a political strategy for AMR, and an action plan for food waste.

Data Gathering

Data stem from elite surveys sent out electronically in the winter of 2014 (fracking) and the summer/fall of 2022 (food waste and AMR). Response rates were satisfactory, reaching 54% (22 of 41 actors) in the case of fracking, and 71.2% (47 of 66 actors) and 62.7% (37 of 59 actors) for food waste and AMR, respectively. To identify survey partners, we relied on the traditional combination of the positional, decisional, and reputational approaches (Knoke et al., 1996). We first identified actors with the formal competences to regulate the issue (positional), then added the ones that appeared during the decision-making process (decisional). Finally, two to four expert interviews per case were conducted to validate the list and to add more actors if necessary (reputational). This is the "standard" procedure also used for mature subsystems. However, for nascent subsystems, we suggest emphasizing the reputational approach to compensate for a lack of policy process history and administrative routine and the attribution of clear competences to selected authorities. Hence, there is only limited material to conduct the positional and decisional

approaches. Survey respondents were, therefore, asked to add relevant actors. Overall, 22 actors for fracking, 47 for food waste, and 37 for AMR were retained for analysis, representing municipal authorities, administrative agencies, green NGOs, universities, and industry associations (for a full list of actors and actor types, see Appendix 1).

Policy Core Beliefs, Secondary Aspects, and Cluster Analysis

To identify policy core beliefs and secondary aspects in a nascent subsystem, we rely on the ACF literature (Sabatier, 1998) and on empirical ACF research of familiar subsystems in the same jurisdiction or of the same subsystem in other jurisdictions and countries. This last procedure is designed mainly to compensate for a lack of knowledge and documentation about potential beliefs and secondary aspects, such as policy instruments to regulate the new issue.

Potential policy core beliefs for oil and gas regulation in Neuchâtel are deduced from policy core beliefs investigated in energy policy in Switzerland (Fischer, 2015) as well as from other fracking cases (Heikkila et al., 2018): economic efficiency, market competitiveness, environmental compatibility, citizens' security, security of supply, federal subsidiarity, international independence, and social equity. To identify the policy core beliefs for food waste, we consult studies on food waste (Beretta & Hellweg, 2019) as well as waste management in Switzerland (Duygan et al., 2018), which yield the following policy core beliefs: economic efficiency, market competitiveness, environmental compatibility, public health, security of supply, and social equity. For AMR regulation in Switzerland, policy core beliefs are deduced from studies investigating micro-pollutants in waters (Herzog, 2020; Schaub, 2021) as well as existing literature on AMR regulation in Germany (Vogeler et al., 2021): economic efficiency, environmental compatibility, citizens' security, market competitiveness, public health, autonomy of agriculture, and animal welfare. Policy core beliefs, in contrast to deep core beliefs, are specifically relevant for policymaking. We then ask actors to prioritize (high, medium, low) the policy core beliefs in relation to the relevance they attribute to each of the beliefs when it comes to regulating the issues of fracking, food waste, or AMR, respectively. These are clearly related to the issue and within the boundaries of the specific policy process investigated, which is why we consider them as policy core rather than deep core

beliefs. However, as many ACF applications have witnessed, it can be challenging to set the (empirical as well as conceptual) boundaries between the different belief levels of the three-tiered hierarchy (Jenkins-Smith et al., 2018).

Secondary aspects include policy instruments to regulate fracking, food waste, and AMR. For oil and gas regulation in Neuchâtel, we include a range of instruments that regulate the underground, and these are deduced from legal documents and environmental regulations in Switzerland: ten types of environmental regulations (including air and water quality control, infrastructure security, and the compensation of local communities) and five policies regulating the use of unconventional gas (exploitation, exploration, site development, moratorium, and ban). For food waste, we consult the recent action plan for the reduction of food waste (Federal Council, 2022), as well as a position paper from the World Wildlife Fund (WWF) and Interface (Landis & Heimann, 2021), to deduce 17 policy measures that cover the full range from regulative instruments to market-based and information measures. For the regulation of AMR, we deduce 15 measures from the existing political strategy for antimicrobial resistances (Federal Council, 2015). The strategy proposes instruments to both prevent and control this issue in the different affected sectors (water, agriculture, and public and animal health) ranging from coercive measures related to the import, manufacturing, and distribution of the antibiotics to voluntary instruments to prevent resistances, with public and private commitments.[2]

To identify the belief clusters of actors sharing policy core beliefs and/ or secondary aspects, we calculate dissimilarity (Euclidian distances) of actors' positions toward the set of core beliefs and secondary aspects, separately. This results in a matrix of dissimilarity/distance: The cell between two actors indicates how distant they are in terms of core beliefs and secondary aspects. The bigger the number between two actors, the higher their disagreement on both dimensions. Zero would indicate complete congruence on all core beliefs and secondary aspects between two actors. Based on this dissimilarity matrix, cluster analyses (k-means clustering in R) clustering actors with small belief distances were computed.[3]

Measuring Belief Fragmentation

As shown above, different authors notice that in nascent subsystems "beliefs are fluid and fragmented" (Sabatier & Brasher, 1993), for example, unstable over time. With Expectations 1a and 1b, we propose two different ways on how to assess such fragmentation and fluidity, one focusing on the individual belief system of each actor and the coherence therein, and one focusing on actors' joint agreement on beliefs (typically within a belief cluster).

Actors' belief coherence: The ACF states that core beliefs translate into secondary aspects of some sort (Sabatier & Jenkins-Smith, 1993). Therefore, there must be at least an implicit logic between a policy core belief (e.g., the degree of state intervention prioritized to tackle a new issue) and the secondary aspect of choice (e.g., policy instrument to regulate the new issue). Expectation 1a is confirmed if actors lack coherence between the type of policy core beliefs they prioritize and the type of secondary aspects they agree upon.

Belief cluster consensus: Based on the cluster analysis introduced above, we observe whether actors cluster similarly on policy core beliefs and on secondary aspects. An indicator for this "belief agreement among peers" is the simple overlap in cluster membership between the clusters based on core beliefs and secondary aspects. Important differences in cluster memberships between both confirm Expectation 1b that actors do not agree on both policy core beliefs and secondary aspects in nascent subsystems.

Measuring Coordination Patterns

We present to all survey partners a list of the actors included in the analysis, and ask the following question: "With what other organization does your organization strongly coordinate actions when it comes to the regulation of fracking/food waste/AMR?" This question helps us to draw a coordination network among all actors in the subsystem, with "1" indicating the presence and "0" the absence of a coordination tie between two actors.[4] In order to test Expectations 2a and 2b, we simply calculate the densities, thus the number of observed coordination ties compared to all possible ties within and across the belief clusters. The higher the number, the denser the coordination network within or across each cluster.

Within-cluster coordination: Expectation 2a is confirmed if there is no clear pattern of higher coordination densities within policy core belief clusters as compared to the coordination densities within secondary aspects clusters.

Across-cluster coordination: Expectation 2b is confirmed if coordination within belief clusters is not denser than coordination across belief clusters.

EMPIRICAL FINDINGS

Belief Fragmentation and Coherence

Parts of our analyses rely on the separation of actors into two belief clusters.[5] In the heat maps (Fig. 1a–f), these clusters are separated by the thin white line between an upper and a lower set of actors. Actors appear on the vertical line, core beliefs, and secondary aspects on the horizontal axis. First, all clusters for each subsystem are different between policy core and secondary beliefs in each subsystem, suggesting that in all three cases there is no clear correspondence between how actors position themselves on policy beliefs or secondary aspects, respectively.
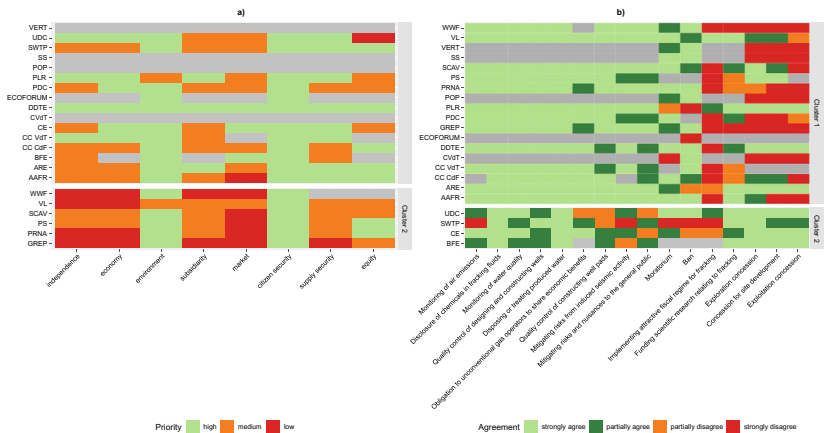

Fig. 1 Heatmaps indicating actors' beliefs and policy preferences in the three subsystems (*Note* **a** Policy core beliefs of fracking subsystem; **b** secondary beliefs of fracking subsystem; **c** policy core beliefs of food waste subsystem; **d** secondary beliefs of food waste subsystem; **e** policy core beliefs of AMR subsystem; **f** secondary beliefs of AMR subsystem)

Fig. 1 (continued)

Fig. 1 (continued)

In the fracking case, and based on policy core beliefs, a set of 6 actors from the left-green spectrum of political actors (green NGOs and left and green parties) is separated from the rest of the 22 actors. By contrast, the structure based on secondary beliefs separates an even smaller set of 4 actors from the rest and includes all those actors opposed

to a fracking ban. Note that minority cluster 2 (four organizations) in secondary aspects has no actor overlap with minority cluster 2 (six organizations) in policy core beliefs, clearly suggesting a lack of coherence between policy core beliefs and secondary aspects.

In the food waste subsystem, 15 actors cluster together against the rest based on policy core beliefs. The policy core belief structure is very homogenous between the two clusters (see heatmaps in next section). However, the smaller cluster 2 (15 mainly economic and liberal organizations) exclusively prefers ecological compatibility and economic effectiveness for the regulation of the food waste sector. The larger cluster 1 (32 organizations) further prioritizes social equity and supply security. The clustering based on secondary aspects related to food waste regulation shows a more equally distributed repartition: 21 actors in cluster 1 and 26 actors in cluster 2. The types of actors are very diverse in both clusters, perhaps with a tendency that in the larger cluster 2, more pro-ecology actors are represented that prefer a wide portfolio of policy instruments to address food waste. This again suggests a lack of coherence between both types of beliefs.

In the AMR subsystem, the clustering of policy core beliefs creates one small cluster 2 (7 actors) against the rest. But like Food Waste, the prioritization of policy core beliefs is very similar between clusters 1 and 2. The smaller cluster 2 prioritizes animal welfare and citizens' security to a greater degree than cluster 1 does. A more nuanced picture is shown when looking at the cluster analysis of the secondary aspects: Again, a very small number of actors (5) is clustered against the rest (cluster 2). They include the farmers' association (SBV), different sub-associations related to meat production (Suisseporc and Proviande), and the pharmaceutical industry as well as veterinary medicine (pharmaSuisse and GST). They are strongly opposed to any market regulation or the introduction of market-based instruments.

In-Depth Belief Analysis

The fracking subsystem is the only one where actors form two clearly distinct clusters based on their policy core beliefs. The smaller cluster 2 is clearly a "pro-ecology" group with actors favoring environmental protection, citizens' security, and social equity. Regarding Fig. 1b and the heatmap of secondary aspects for the fracking subsystem, it becomes clear that the 4 (economic, right-wing) actors of cluster 2 prefer all the

policy instruments that do not impede the exploration and exploitation of unconventional oil and gas resources (the green cells on the right end of the heatmap), whereas the dominant cluster 1 is in favor of all instruments that regulate or even ban fracking to some extent (Fig. 1b).

The policy core heatmaps (Fig. 1c and e) for food waste and AMR look very similar: There is no strong divide between the two clusters. The decisive ideological conflicts in those two subsystems happen around secondary aspects and preferences for specific policy instruments (Fig. 1d and f). In cluster 2 of the food waste subsystem and based on secondary aspects (Fig. 1d), actors generally prefer all instruments and just want food waste to be regulated in "some form." Cluster 1, including mainly business and right-wing actors, is also generally in favor of food waste regulation but has a disagreement with market-based interventions and the introduction of instruments that allocate responsibilities to the public sector (e.g., introducing a steering committee for coordination in the public sector). Similarly, cluster 2 in the AMR subsystem (Fig. 1f) is against all incentive measures and direct payments in the agricultural but also the veterinary and human health sectors.

Coordination Within and Across Clusters

In all three cases (see Table 2), we observe more coordination on secondary aspects than on policy core beliefs (Expectation 2a) and some densities (see values in bold) that are higher across clusters than within clusters (Expectation 2b). There are slight differences between the cases, however. In the fracking case, we observe a relatively high density within both clusters (and with respect to both policy core and secondary aspects). Mainly for cluster 1 in the secondary aspects, this is not so surprising: all actors were against any type of exploration or exploitation of the underground to take place in relation to fracking (Ingold & Fischer, 2016). However, the five actors (cluster 2 of secondary aspects) who were against a fracking ban also coordinated their actions well. Thus, in this case, which was confronted with a very specific policy output at the sub-state level (a discussion on a specific site and a related ban of fracking technologies), we observe patterns like those typically found in mature subsystems. However, we also see strong (and stronger than within-cluster) coordination efforts from cluster 1 to cluster 2, which would tend to indicate coordination that is not solely dependent on a consensus of actors on policy core beliefs and secondary aspects.

Table 2 Within- and across-cluster coordination densities

		Densities in coordination	
		Cluster 1	*Cluster 2*
Fracking			
Policy core beliefs (PCB)	Cluster 1	0.34	**0.27**
	Cluster 2	0.20	0.27
Secondary aspects (SA)	Cluster 1	0.30	**0.36**
	Cluster 2	0.13	0.58
Food waste			
PCB	Cluster 1	0.29	**0.20**
	Cluster 2	**0.25**	0.17
SA	Cluster 1	0.20	**0.24**
	Cluster 2	**0.21**	0.30
AMR			
PCB	Cluster 1	0.19	**0.14**
	Cluster 2	0.11	0.14
SA	Cluster 1	0.16	0.14
	Cluster 2	**0.24**	0.35

Coordination in the food waste subsystem is largely driven by one cluster. While cluster 1 coordinates more strongly on policy core beliefs, cluster 2 does so more strongly with respect to secondary aspects. Overall, coordination does not appear to be stronger based on secondary aspects than based on policy core beliefs (hence, no support for Expectation 2a). However, even more so than in the fracking case, and in line with Expectation 2b, coordination values across clusters are higher than at least some of the within-cluster coordination values. In the case of AMR, the minority cluster 2 displays a very high within-cluster density for secondary aspects and coordinates actions with cluster 1 more than cluster 1's own members do. This is evidence in support of both expectations.

Discussion and Conclusion

When looking at the belief coherence of single actors (Expectation 1a), we observe no clear pattern. Actors prioritizing a particular set of policy core beliefs do not necessarily agree on the related or respective secondary aspects to build a belief cluster. For example, the six actors of the pro-ecology cluster in the fracking case do not subsequently build their own

"pro-ban" cluster based on secondary aspects. They are absorbed in the large cluster of actors being in favor of a range of fracking restrictions and regulatory measures. The same holds true for the four actors opposed to a ban on exploring and exploiting fracking: they share their core beliefs with the very large and heterogenous policy core belief cluster 1 and are not able (yet) to build their own advocacy coalition with coherent policy core *and* secondary beliefs. This is even more evident in the food waste and AMR regulation cases, where the composition of actors between the policy core and the secondary aspects is clearly incoherent: In both subsystems, there is a minority cluster 2 of secondary aspects opposed to any market intervention by the state. However, they do not build a coherent coalition where policy core beliefs would also predict this choice (e.g., by emphasizing market freedom; see Fig. 1c and e).

To test whether actors who agree upon policy core beliefs also agree on secondary aspects (Expectation 1b), we assess belief cluster overlap. Generally speaking, we can confirm this Expectation for all three cases: The overlap in membership of belief clusters is rather poor (see Appendix 2). The lack of overlap is more striking for the food waste and AMR cases on the national level than for the fracking subsystem in Neuchâtel. As opposed to the fracking case, the food waste and AMR cases show no clear pattern of one single cluster of actors with coherent policy core and secondary aspects.

In terms of coordination, we observe evidence for both expectations. Secondary aspects can shape coordination patterns at least as much as policy core beliefs: Even when the size of the coalition is rather equilibrated (e.g., food waste subsystem), the densities related to secondary aspects can be higher than those related to policy core beliefs (confirmation of Expectation 2a). Across-cluster densities are often higher than within-cluster densities. In nascent subsystems, coordination is, thus, not shaped by beliefs only (confirmation of Expectation 2b) and more strongly by secondary aspects than by core beliefs. However, the belief homophily hypothesis is also not always corroborated in mature subsystems. Calanni et al. (2015) and Pierce et al. (2017) are among several that find that this belief homophily is more prevalent in adversarial policy subsystems than in collaborative ones, which suggests that perceived threats of opponents trigger policy actors to coalesce with like-minded others (e.g., devil shift; see Fischer et al., 2016). Furthermore, the literature on mature subsystems concludes that depending on the context and institutions at play, different belief levels (policy core or secondary aspects)

become more or less relevant (Cairney et al., 2018; Koebele, 2020) in relation to coordination patterns.

In this chapter, we ask what belief system structures and coordination patterns are typical for political actors involved in nascent subsystems. Still, our discussion is implicitly based on the assumption that beliefs are less fragmented and more coherent and consensual in mature subsystems. Many ACF applications could confirm the belief hierarchy (and that actors tend to agree more on policy core than secondary aspects; Nohrstedt et al., 2023; Pierce et al., 2017), but some applications also showed more coherence on secondary than policy core beliefs (Malkamäki et al., 2021; Sommerville et al., 2022) or changes in intra-coalition belief cohesion over time (Lundmark et al., 2018). However, these inconsistencies are sometimes related to how a researcher defines a policy core versus a secondary belief or how these beliefs are measured (Nohrstedt et al., 2023).

Overall, in the AMR and the food waste subsystems, and to a certain extent even in the fracking case, the consensus on certain beliefs is very restricted, joint beliefs do not systematically lead to coordination actions, and there is low coherence between policy core beliefs and secondary aspects. This is in line with the literature on "ephemeral coalitions" or "coalitions of convenience" (Ingold et al., 2017; Stritch, 2015), but our results also show that future research should more systematically acknowledge that the different belief clusters or coalitions in a subsystem can have diverse degrees of maturity. Furthermore, future research should compare nascent and mature subsystems more rigorously to confirm these findings. Another pathway for the development of nascent subsystem-specific hypotheses would be the study of one or several subsystems from their early to the more mature stage and observing how a new issue arrives on the agenda along this pathway. Finally, given that actors might not know the beliefs of other actors that well and, thus, cannot coordinate according to beliefs, analyzing how actors meet in venues in order to learn more about the issue as well as about other actors' positions and coordination opportunities is another important area for future research.

Appendix 1: List of Actors

Actors' List Fracking Neuchâtel

Actor acronym	Full actor name	Category 1 = Pol-admin; 2 = Industry; 3 = NGO;4 = Science
AAFR	Friends of Farm Roberts Association	3
ARE	Federal Office for Spatial Development	1
BFE	Federal Office of Energy	1
CC CdF	City Council of Chaux-de-Fonds	1
CC VdT	City Council Val-de-Travers	1
CE	Celtique Energie Ltd	2
CVdT	Collectif Val-de-Travers	3
DDTE	Department of spatial development and the environment	1
ECOFORUM	Umbrella organization for the Protection of the Natural Heritage of Neuchâtel	3
GREP	Greenpeace Neuchâtel	3
PDC	Christian Democratic People's Party	1
PLR	FDP. The Liberals	1
PS	Social Democratic Party	1
POP	Swiss Party of Labour	1
PRNA	Pro Natura Neuchâtel	3
SCAV	Cantonal office of consumption and veterinary	1
SS	Solidarity	1
SWTP	Federal Office of Topography Swisstopo	1
UDC	Swiss People's Party	1
VERT	Green Party	1
VL	Green Liberal Party	1
WWF	WWF Neuchâtel	1

Actors' List Food Waste

Actor acronym	Full actor name	Category 1 = Pol-admin; 2 = Industry; 3 = NGO;4 = Science
Agridea	Consulting of cantonal agricultural servics	1
AryztaFood	Aryzta Food Solutions Switzerland	2
BAFU	Federal Office for the Environment	1
BFS	Federal Statsitical Office	1
Biosuisse	Biosuisse	2
BLV	The Federal Food Safety and Veterinary Office	1
BLW	Federal Office for Agriculture	1
Caritas	Caritas	3
Coop	Coop Group	2
Danone	Danone Group	2
Denner	Denner Group	2
Emmi	Emmi Group	2
FDP	Free Democratic Party of Switzerland	1
Fenanco	Fenanco	2
FIAL	Federation of Swiss Food Industries	2
Foodways	Foodways Consulting GmbH	2
GastroSuisse	Gastro Suisse	2
GLP	Green Liberal Party	1
GPS	Green Party of Switzerland	1
HotellerieSuisse	Hotellerie Suisse	2
IG DHS	Interest group retail trade Switzerland	2
IKEA	IKEA Switzerland	1
JOWA	JOWA AG	1
Kompostforum	Kompostforum	3
Lidl	Lidl Switzerland	2
Micarna	Micarna SA	2
Migros	Migros Group	2
Proviande	Sector organization of the Swiss meat industry	2
PUSCH	Stiftung praktischer Umweltschutz Schweiz	3
SBLV	Swiss Farmers' Association	2
SBV	Schweizerischer Bäuerinnen- und Landfrauenverband	2

(continued)

Actor acronym	Full actor name	Category 1 = Pol-admin; 2 = Industry; 3 = NGO;4 = Science
SchweizerTafel	Swiss Table—non profit	3
SECO	State Secretariat for Economic Affairs	1
SP	Social Democratic Party	1
SVGroup	SV Group	2
Swisscofel	Swiss Association of Fruit, Vegetable and Potato Trade	2
Swisspatat	Swiss potatoes interbranch organization	2
Swissretail	Association of retail trade companies	2
Tischleindeck	Tischlein deck dich	3
Too good	Too good to go	3
Valora	Valora Group	2
Vereinfoodwaste	Food waste association	3
VKCS	Association of Cantonal Chemists Switzerland	1
Volg	Volg Group	2
WWF	World Wildlife Fund Switzerland	3
ZFV	ZFV Group	2
ZHAW	Zurich University of Applied Sciences	4

Actors' List AMR

Actor acronym	Full actor name	Category 1 = Pol-admin; 2 = Industry; 3 = NGO/health;4 = Science
ANRESIS	Swiss Centre for Antibiotic Resistance	4
BAG	Federal Office of Public Health	1
BAFU	Federal Office for the Environment	1
Bell	Bell Group	2
BLV	The Federal Food Safety and Veterinary Office	1
BLW	Federal Office for Agriculture	1
EAWAG	Swiss Federal Institute of Aquatic Science and Technology	4
EFBS	Swiss Expert Committee for Biosafety	4
FDP	Free Democratic Party of Switzerland	1
FiBL	Research Institute of Organic Agriculture	4
FMH	Swiss Medical Association	3
GDK	Conference of Cantonal Health Directors	1
GPS	Green Party of Switzerland	1
GST	Swiss Veterinary Society	3
Interpharma	Association of Switzerland's research-based pharmaceutical	3
kf	Consumers' forum	3
KGD	Swiss Calf Health Service	3
KOLAS	Swiss Conference of Cantonal Agriculture Services	1
LDK	Conference of Cantonal Agricultural Directors	1
Micarna	Micarna Group	2
pharmaSuisse	Swiss Pharmacists Association	2
Proviande	Proviande	2
RT_Antibiotics	Round Table Antibiotics	1
SBV	Swiss Farmers' Association	2
Scienceindustries	Business Association Chemistry Pharma Life Sciences	2
SMP	Swiss Milk Producers	2
SP	Social Democratic Party	1
Suisseporcs	Swiss Association of Pig Breeders and Producers	2
SVK	Swiss Association for Small Animal Medicine	3
SVW	Swiss Association for Ruminant Health	3

(continued)

Actor acronym	Full actor name	Category 1 = Pol-admin; 2 = Industry; 3 = NGO/health; 4 = Science
Swissmedic	Swiss authority responsible for the authorization and supervision of therapeutic products	1
Swissnoso	National Center for Infection Prevention	1
SwissTPH	Swiss Tropical and Public Health Institute	4
UniBe	University of Bern	4
UniBe_Vetsuisse	University of Bern, Vetsuisse faculty	4
UZH_Vetsuisse	University of Zurich, Vetsuisse faculty	4
VSKT	Swiss Association of Cantonal Veterinarians	1

Appendix 2: Composition of Clusters Based on Policy Core Beliefs and Secondary Aspects

		Cluster 1	Cluster 2
Fracking	Policy core belief clusters	**Diverse actors cluster (16)**	**Pro-ecology cluster (6)**
		AAFR, ARE, BFE, CC CdF, CC VdT, CE, CVdT, DDTE, ECOFORUM, PDC, PLR, POP, SS, SWTP, UDC, VERT	GREP, PRNA, PS, SCAV, VL, WWF
	Secondary aspects clusters	**Pro-ban cluster (18)**	**Pro-exploration cluster (4)**
		AAFR, ARE, CC CdF, CC VdT, CVdT, DDTE, ECOFORUM, GREP, **PDC, PLR, POP,** PRNA, PS, SCAV, **SS, VERT,** VL, WWF	BFE, CE, SWTP UDC
Food waste	Policy core belief clusters	**Supply security cluster (32)**	**Environment-economy cluster (15)**
		Agridea, AryztaFood, BFS, Kompostforum, Swisspatat, VKCS, ZFV, SVGroup, Valora, JOWA, SP, Volg, GPS, Swisscofel, GastroSuisse, Lidl, Emmi, FIIAL, WWF, Biosuisse, BAFU, Fenaco, SchweizerTafel, PUSCH, VereinFoodwase, Too good, Migros, Foodways, IG DHS, BLW, Tischleideck, ZAHW	IKEA, SBLV, Proviande SECO, **Danone**, Denner HotellerieSuisse, Caritas FDP, Micarna, **GLP** Swissretail, **SBV**, Coop, **BLV**
	Secondary aspects clusters	**No market-based cluster (21)**	**Integrative action against FW cluster (26)**
		Agridea, Kompostforum **Swisspatat, VKCS, JOWA** **Swisscofel, Lidl, FIAL** **IG DHS, Tischleindeck,** IKEA, SBLV, Proviande SECO, Denner HotellerieSuisse Caritas, FDP Micarna Swissretail, Coop	AryztaFood, BFS, ZFV SVGroup, Valora, SP Volg, GPS GastroSuisse, Emmi, WWF Biosuisse, BAFU, Fenaco SchweizerTafel, PUSCH VereinFood Waste Too good, Migros Foodways, BLW, ZHAW, **Danone, GLP, SBV, BLV**
AMR	Policy core belief clusters	**Diverse actors cluster (30)**	**Security-animal welfare cluster (7)**
		Bell, GPS, RT_Antibiotics, SVK, EAWAG, FDP, Proviande, SwissTPH, SVW, Swissnoso, Micarna, FMH, SMP, UniBe, KGD, SP, ANRESIS, BAFU UZH_Vetsuisse UniBe_Vetsuisse, GDK, Suisseporcs, SBV, BAG, BLV, Interpharma, Swissmedic, BLW, VSKT, LDK	Kf, EFBS, Scienceindustries FiBL, GST, KOLAS, pharmaSuisse
	Secondary aspects clusters	**Integrative action to regulate AMR (32)**	**No market regulation cluster (5)**
		Bell, GPS, RT_Antibiotics, SVK, EAWAG, FDP, SwissTPH, SVW, Swissnoso, Micarna, FMH, SMP, UniBe, KGD, SP, ANRESIS, BAFU, **UZH_Vetsuisse** **UniBe_Vetsuisse, GDK, BAG, BLV, Interpharma, Swissmedic, BLW, VSKT, LDK,** Kf, EFBS, Scienceindustries FiBL, GST, KOLAS	Proviande, Suisseporc, SBV, **GST, pharmaSuisse**

Note Actors with the same color stay together in the same belief cluster (policy core and secondary beliefs). See Appendix 1 for actor acronyms and full names

NOTES

1. One way to study a nascent subsystem is to investigate a new policy output. Bandelow and Kundolf (2011), for instance, analyze the Galileo program and identify the process leading to it as a nascent subsystem. Similar is the case of Fidelman et al. (2015) and the Coral Triangle Initiative in Indonesia.
2. Note that policy core beliefs and secondary aspects where actors showed no variation in terms of their acceptance were not used for the cluster analyses but are still displayed in the heatmaps.
3. Several actors had missing values on their positions regarding policy core beliefs and secondary aspects. For these cases, we have imputed their core beliefs and secondary aspect values based on the mean value of core beliefs and secondary values of all actors. This procedure is relevant for the cluster analysis; in the heat maps, missing values appear as grey cells.
4. Note that for the case of oil and gas regulation in Neuchâtel, we asked about "information exchange" as the concrete type of coordination, whereas for food waste and AMR, we asked about "collaboration."
5. We restrict our analysis to solutions with two belief clusters, as these are—besides many solutions that separate one single actor from all other actors—the cluster solutions with the least error (errors being represented by agreements on beliefs across clusters and lack of agreement of beliefs within clusters).

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