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Studying the datafied home: The potentials of combining mixed methods, constructivist grounded theory and social network analysis

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Studying the datafied home: The potentials of combining mixed methods, constructivist grounded theory and social network analysis

1 Introduction

Over the last decade, the social, cultural, and political consequences of datafication have been addressed by a growing body of research. As highlighted by Flensburg and Lomborg (2021) in their review of datafication research, starting from 2015 an increasing number of studies addressed this topic, although mainly from a theoretical perspective. Indeed, theoretical contributions make up over 50% of the overall body of works on datafication, while empirical and methodological publications represent only 25% and 15%. Furthermore, 70% of empirically-oriented studies employ qualitative methods; conversely, only 9% and 16% adopt respectively a quantitative or mixed methods research design. In addition, the authors outlined how the meso perspective is the main nucleus of analysis (50%), followed by the macro (32%). Conversely only 14% focus on "a micro-level of everyday life" (Flensburg & Lomborg, 2021). In general, theoretical research is mostly macro-oriented, while empirical is organisational or user-centered.

This composition of the research field reveals a series of knowledge gaps. The predominance of theoretical contributions might under-depicting the context in which data emerge, which is not universal and unproblematic (Milan & Treré, 2019), but shows peculiarities as well as idiosyncrasies. Along these lines, the residual focus on the micro-level, both in empirical and methodological contributions, lacks deepening individuals' agency. Indeed, data-driven media are domesticated (Silverstone, Hirsch & Morley, 1992) through culturally and socially connotated trajectories that cannot be traced back to homogeneous patterns. Moreover, as these processes follow gender and generational trajectories, their influence on the media-related structure of relationships and consequently on the power balance (Hepp & Hasebrink, 2018), since media are increasingly incorporated into everyday routines, temporalities and communicative practices, needs to be addressed. Otherwise, the resulting risk is relying on potentially abstract knowledge that doesn't leverage the potential of empirical research and corresponding methods to understand datafication. In particular, in this direction, mixed methods, although representing an under-employed design within the field, might address datafication from multiple but complementary analytical perspectives (Creamer, 2021).

Consequently, this contribution aims to delineate a methodological proposal drawing upon data collected within one of the twenty families with at least one child aged eight or younger involved in a qualitative longitudinal research on the datafication of childhood and family life in Italy. The results suggest that framing families as communicative figurations (Couldry & Hepp, 2017; Hepp et al., 2018) and employing mixed methods constructivist grounded theory (Creamer, 2021) that apply social network analysis allow materialising the media-related structure of relationships through, about, and around data that emerge in contemporary family life.

2 Mixed Methods Constructivist Grounded Theory for a figurational approach

Some methods and approaches have been accredited as more suitable to disentangle the situated nature of data practices while fostering the empowerment of research subjects (Costanza-Chock 2018, D'Ignazio & Klein, 2019). Mattoni (2020), in her analysis of data-enabled activism, argues that grounded theory (GT) is particularly useful for studying

emergent phenomena such as datafication and for selecting case studies in a way that is sensitive to different practices across diverse contexts. She underlines that this method "might help researchers to produce knowledge that escapes a universalistic reified vision of datafication detached from the lived experiences of the many social actors that deal with it" (Mattoni, 2020).

GT today can be understood as a family of methods aimed at generating middle-range theory starting from different kinds of data - mostly qualitative, but not only - through a process of incremental abstraction that puts coding and the comparison of codes and cases at the core of the analytical iterative process. This method is rooted in the seminal work of Glaser and Strauss (1967) and was developed to a great extent over the years resulting in many versions, whose most notable are that of Strauss and Corbin (1998), the situational analysis by Clarke (2003) and the constructivist approach of Charmaz (2014), which gained a lot of attention and showed its potential in various fields.

The constructivist grounded theory (CGT) assumes that both data and analyses are social constructions that reflect what their production entailed and also explores and discovers patterns and connections among categories in the data and assumes emerging multiple realities and indeterminacy (Charmaz, 2006). This approach seems particularly consonant with the social-constructivist tradition of mediatization (Hepp, 2019) that considers the social world as amenable to interpretation and comprehension (Couldry & Hepp, 2017). Within such a phenomenological perspective, the meaning-making practices through which digital media are appropriated in the context of daily life (Mascheroni & Siibak, 2021) are at the core of analysis and the 'everyday' - as the critical site where the social is made and remade (Silverstone, Hirsch & Morley, 1992; de Certeau, 1984) – represents the entry point of empirical investigation. Moreover, as media artifacts, in particular digital media, are increasingly central for the articulation – and rearticulation – of daily temporalities, materialities and practices (Kennedy, Poell & Van Dijck, 2015), the analysis of micro-level enables understanding datafication as a socially situated experience that varies across everyday material contexts (Breiter & Hepp, 2018; Couldry & Hepp, 2017; Kennedy & Bates, 2017; Mascheroni, 2020). Along these lines, CGT's emphasis on reflexivity and critical inquiry can help to disentangle the situatedness of digital media (and related practices and imaginaries), which the more constitute the backbone of daily life and routines the more become invisible and taken for granted (Ling, 2012), by taking into account the entanglements of data relations - namely relations and communicative practices that are mediated, sustained, and shaped by data-driven digital technologies (Couldry & Mejias, 2019) - with the pre-existing structure of relationships and consequently with certain power relations.

Even if CGT became central in the qualitative tradition, many scholars outlined the possibility to connect this approach with mixed methods. As stated by Charmaz: "an emerging grounded theory can indicate needing more than one type of data and can incorporate more than one type of analysis" (2014, p. 323). Along these lines, Walsh observed: "A [grounded theory] may thus be generated using qualitative and/or quantitative data, methods, and techniques" (2015, p. 536). Mixed methods grounded theory methodology (MM-GTM) can be defined as a "methodology that embeds a dialectical logic in the constant comparative method and grounded theory procedures to develop a mid-level theoretical framework or to elaborate an existing one" (Creamer, 2021, p.7). It entails a systematic approach to data collection and analysis that combines different sources of data and quantitative and qualitative analytical procedures to engage multiple perspectives to achieve analytic density (Creamer, 2021). This term refers to envisioning constructs in a multi-dimensional way to discern patterns and understand the "complexities of how and why things change and work as they do in certain contexts and circumstances" (Mason, 2006, p. 19).

In addition prioritizing case-based analysis constitutes the lynchpin for data and approaches integration, as suggested by Bazeley: "Each case holds data from different sources and different types together, thus cases provide the lynchpin for integration of data" (2018, p. 26).

Within the repertoire of mixed methods, social network analysis (SNA) shows the potential to integrate qualitative and quantitative approaches (Onwuegbuzie and Hitchcock, 2015) in many different and creative ways (see Edwards 2010 or Dominguez & Hollstein 2014, for a description and discussion of different mixed methods research designs). Mixed methods SNA help to avoid treating networks in an uncontextualized and over-abstract perspective and provide the opportunity to show the cultural content of relationships and their link with broader categories and structures. By doing so, they not only bring the (inter)actors to the front, as emphasised by the literature on mixed methods and qualitative networks (Bellotti, 2015; Crossley, 2010; Edwards 2010; Fuhse and Mützel 2011) but also enable the presentation of the relevance of the contexts where networks are built (Bolibar, 2016).

Therefore, SNA appears promising for studying the domestication of digital media and the everyday entanglements of data relations with practices and imaginaries for three aspects. First, networks realised from data collected via traditional qualitative techniques (such as interviews, observations, and ethnography) incorporate the context dimension – as they represent the peculiarities of each household - and can help to glimpse the articulation of a family figuration. Indeed families can be understood as a communicative figuration (Couldry & Hepp, 2017; Hepp & Hasebrink, 2018) because its members share a *frame of relevance*, i.e a set of cultural values and norms (including, values, norms, hopes, and fears about technologies), interact through a distinctive *communication repertoire* that is based both on a given *media ensemble* and the family's own culture (Couldry & Hepp, 2017). This approach, informed by mediatization research, constitutes a valid analytical tool to account for the complex interactions between members of a family and digital media in the context of pervasive data relations.

Second, SNA provides a set of metrics (such as density, modularity, and centrality measures) that, combined with qualitative analysis, enables building typologies (Bellotti, 2015) that interconnect as two sides of the same coin both the qualitative perspective, which offers better access to the content of relationships (such as cultural values and norms) (Crossley, 2010), and the quantitative one, that focuses on structures emerging from relationships (Bolibar, 2016).

Third, networks' visualisations might map relationships between implicit processes and structures visible (Charmaz, 2006), so as to materialise the relationships through, about and around data that emerge in contemporary family life. This application well dialogues with a figurational approach - as it enables mapping a family figuration outlining actors, their media ensemble, and related media practices - and also with traditional GT mapping (or diagramming) techniques - that assist researchers in analysing data for theoretical integration (Charmaz, 2006) by keeping records of concepts and their relationships (Corbin and Strauss, 2008) – and situational analysis, especially in its further extension (Clarke, 2021). Situational analysis focuses on the ecologies of relations that exist between the various elements found in a given situation and constructs maps to describe it positioning all the constitutive elements, ranging from human to non-human and discursive elements (Clarke, 2021). As suggested by Mattoni (2020), this approach allows to situate data practices and their relationship with datafication as a process.

Moreover, as in CGT generating and collecting data occurs simultaneously with analysing the data, networks' displays can generate new analytical insights for theory development. Indeed the use of visualisations is positioned as a critical step in the analytical process in

both qualitative (Miles & Huberman, 1994) and mixed method (Onwuegbuzie & Teddlie, 2003) research but their use in the development or refinement of theory has not been explored (Buckley & Waring, 2013, Plano Clark & Sanders, 2015), especially in the second type of designs. As noted by Buckley and Waring (2013) they "not only serve as a visual representation of what is being discovered through analysis but also as generative analytical techniques and communicative tools" (p. 149). Consistently with CGT principles, networks built iteratively throughout the entire research process can help researchers to focus on under-explored aspects and bring to the surface the pervasiveness of data relations in everyday life. Moreover, the visualisations can serve also as a stimulus for research participants to reflect on their media-related structure of relationships. This way the reflexivity constructivist assumption is declined both 'upstream' for analytical and theory development and 'downstream' to help participants to overcome the "silence of the social" (Hirschauer, 2006).

3 Methods

To demonstrate the value of MM-CGTM applying SNA on qualitative data for studying datafication of childhood and family life, we illustrate the results in one family who participated in our qualitative longitudinal research, involving 20 households in Italy with at least one child aged eight or younger and three waves of data collection. This family serves as a case study due to the exemplariness of its figuration. Indeed, on the one hand, it shows patterns that recur within the sample's households with similar characteristics, on the other shows relevant changes in media ensemble and related practices during the period of observation, thus accounting for the evolution of the figuration over time.

The qualitative longitudinal research, that articulates adopts MM-CGT design that applies network methods to data from qualitative interviews, involves three waves of data collection from November 2021 to January 2023. Consistently with CGT principles (Charmaz, 2014), the analysis occurred simultaneously with data collection, as shown in Figure 3.1.1.

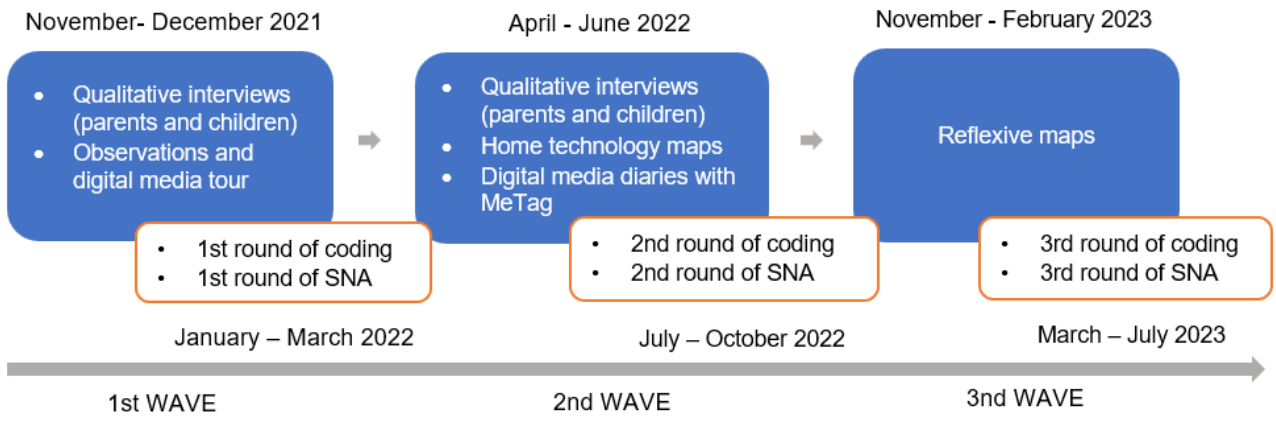


Figure 3.1.1: Diagram of data collection and analysis.

The recruitment procedures took place during October 2021 and lasted until the very first days of November. Families (N=20), with at least one child aged eight or younger, were recruited in the metropolitan area of Milan via purposive and snowball sampling, which involved asking colleagues and acquaintances to share digital and printed flyers illustrating the scope of the project in both their workplace and online circles (Facebook or WhatsApp

local parenting groups). Even if small, the sample includes a diverse demographic range in terms of living conditions and occupations (adopted as a proxy of socioeconomic status), ethnic backgrounds, religious orientation, and family configurations (Widmer, 2021), such as single-child families, families with separated/divorced parents, large families (four to seven children).

Once completed this step, the first wave of data collection was conducted (November-December 2021). Each family's constellation of actors, the digital media ensemble, their data practices, and technological imaginaries were mapped through qualitative interviews with parents and children, as well as observations and visual methods. Interviews, conducted by two researchers, began with an ice-breaking activity in which parents and children were asked to sort out some cards showing pictures of everyday activities and tell about their daily routines. Starting from interesting aspects concerning media, one researcher (when possible[1]) engaged the selected child in a toy and digital media tour (Plowman & Stevenson, 2013), in which the kid documented his/her preferred toys and digital devices by taking photographs, while the other one interviewed parents about family's media practices (both shared and individual), the parental mediation style, eventual media-related conflicts, as well as fears, concerns, and expectations about digital media and technologies.

In parallel interviews were transcribed and analysed in MaxQDA. The data analysis was inductive, iterative, and comparative (Charmaz, 2014) and involved several rounds of coding and meetings among the researchers (N=3). First, each proceeded autonomously on a subsample of the entire corpus of interviews (approx. seven families per researcher). Afterward, the team met to compare codes and discuss eventual data interpretation divergencies. Once adjustments were made and minor discrepancies were identified and corrected, a shared code book was finalised and served as a guideline for later data analysis stages. As a second step, after all the transcripts were combined into one shared MaxQDA file, the researchers read and analysed the colleagues' subsamples of transcripts and discussed potential corrections and new interpretations. Finally, the principal investigator examined all the transcripts, refined the codes, and combined them into broader ones to sum up the key themes arisen from the interviews (Daily routines, Device biographies, Digital skills, Media ensemble, Media practices, Parental mediation, Media Negotiations, Parenting, Peer group, Risks, Scaffolding, School, Screen time, Sharenting, Smart speakers, Technological imaginaries, and COVID-19 impacts).

At the same time, SNA was conducted drawing upon interviews qualitative data employing a mixed methods conversion design (Dominguez & Hollstein, 2014; Creswell & Plano Clark, 2011). Conversion designs entail transforming data of one type into another for analysis purposes. In this case, qualitative data were converted into numerical codes (quantitising strategy) and re-analysed quantitatively (Dominguez & Hollstein, 2014). Therefore, to describe the relationship between actors and the digital media ensemble within the household codes concerning media ensemble, media negotiations and parents and children media practices (both individual and shared) were converted into ties and constituted the basis for the realisation of two-mode networks (Neaigus et al., 1994; Bellotti, 2015) – i.e network accounting for relations between two different kinds of nodes. The two sets of nodes respectively comprise family members and devices constituting the household's media ensemble, while the links represent the actor-device connections and indicate who uses which devices. Density (expressing the media ensemble's adoption level as the percentage

[1] In line with a child-centered approach (Noppari et al., 2016) and ethical research with children, researchers paid attention to non-verbal cues through which the youngest signal their agreement (or not) in participating in certain activities and adopted research practices that they can positively experience. In this regard, multiple visits allow for interrupting the observation whenever the child is tired or uncomfortable and designing methods that match their interests.

of actor-device connections recorded out of the total possible links), modularity (that accounts for the network's articulation in separated but still connected areas), degree, and weighted degree were computed to identify the most relevant actors and devices.

To gain a deeper understanding of how digital media and media practices are made meaningful within the household according to different trajectories and intensities, the weight of the edges – proxies of specific media practices – is proportional to the level of relevance (low-medium-high) attributed to that particular medium by interviewees. The weight was estimated from codes by combining the frequency of each device's mentions with the 'sentiment' attributed to practices involving it. This accounts for their affective, relational, and symbolic connotations (for example, when they operate to improve the parent-child relationship or when access to a medium acts as a doorway for children's empowerment). Finally, Yifan Hu was employed as a layout algorithm to spatialise the networks and highlight complementarities.

In addition, the two-mode networks were converted – via geometrical projection – into one-mode ones in which every node is a family member and each link represents a device adopted by both actors. This kind of network allows to glimpse the distribution pattern of the media ensemble and the media-related structure of relationships among family members.

Researchers then employed the visualisations of one-mode and two-mode networks as analytical tools to discern households' media distribution and usage peculiarities and discuss aspects regarding media practices and related imaginaries worth to be deepened in the following waves of data collection.

From April to May 2022, the second wave was led. The researchers used the map drawing method (Watson et al., 2022) to conduct group interviews at home. With pen and paper, parents and children were asked to sketch the spatialities of their homes and everyday spaces, including the location of digital media in each room, and to indicate, with different colours or arrows, who mostly used which media, and how some devices moved between spaces during a typical day. Afterward, starting from drawings, researchers and participants discussed about family routines, power relations around media and material space. At the end of this second round of interviews, researchers invited parents to complete a digital media diary on the MeTag app for one week by reporting the selected child's media activities. In particular, they were asked to record his/her digital media consumption each day, the device adopted (through a multiple choice list), the duration of use (including start and end time), the practice (e.g., watching TV), the setting (e.g., the living room, bedroom, kitchen), and the person who eventually participated to the activity (e.g. parents, siblings, nanny, grandparents) (Mascheroni & Zaffaroni, 2022).

The interviews' transcripts were then coded accordingly to the protocol established during the first wave. The code book was broadened to account for new emerging codes – such as Objectification, that account for devices' collocation within family's everyday spaces. Iteratively, a second round of SNA was conducted. In this phase, the two-mode networks (and consequently the one-mode projections) were built following the same procedures of the first wave, with a small implementation. The selected child edges' weight triangulates device mentions, practices sentiment - as they emerged during home interviews - and the time dimension, namely the weekly average medium consumption reported within the digital media diary. Even if aware of the eventual (and not so unlikely) mismatch between the reported time and the effective one, the 'duration feature' may help to tackle entanglements and eventual misalignments between parental mediation style, technological imaginaries, and specific media practices.

The networks' displays and metrics were then compared with those of the first wave to examine the evolution of the figuration over time concerning routines, practices, and even rules relating to media, as well as the media ensemble composition and its distribution among family members.

Furthermore, these visualisations were employed as 'reflexive maps' to foster participants' reflexivity and co-participation during the third and final visit (December-February 2023). Indeed researchers engaged interviewees by showing them the patterns characterising their family figuration, especially regarding gender and generational aspects that are mediated and sustained by the use of digital media. This was aimed at bringing the surface taken-for-granted aspects thus fostering reflexivity about data relations in the digital-material context of their daily life. In addition, eventual new routines and practices were reported by informants. Afterward, a third round of coding and SNA is going to be implemented following the protocol (described above) established during the various stage of analysis. Data collected throughout the three waves will be then integrated to build typologies describing how data relations impact different family figurations, also considering their influence on the roles and power structure.

To illustrate the value of our methodological proposal, the results concerning the family that serves as a case study are detailed. The two-mode and one-mode networks realised integrating data from the interviews of the first and second wave of the QLR are shown (Figures 4.1, 4.2, 4.3, 4.4), and indexes are reported (Table 4.1, Table 4.2) and compared between the waves (Table 4.3).

5 Results

The results suggest that MM-CGTM that combines SNA within qualitative research might be an effective way to map families as communicative figurations and glimpse some coordinates of the household's media culture.

The case study consists of a four people family: two female children, who were 8 and 10 years old at the time of our first visit, the 40-year-old mother, who works for her father's business, and the 41-year-old father, a manager at a large logistics company, who frequently travels for work. They live in a roomy two-storey apartment in a high-profile complex in a suburban residential area of the city.

Their media ensemble is broad and includes a smart speaker (Alexa), two game consoles (one of which is portable – Nintendo Switch), two smart TVs, a TV with satellite channels, a smartwatch for the older daughter, a tablet owned by parents (whose password is unknown to the children), a kids' tablet for the siblings, two laptops (the mother's current and old ones), and the parents' smartphones. This level of media saturation is evident from the bipartite network of media ensemble and family members.

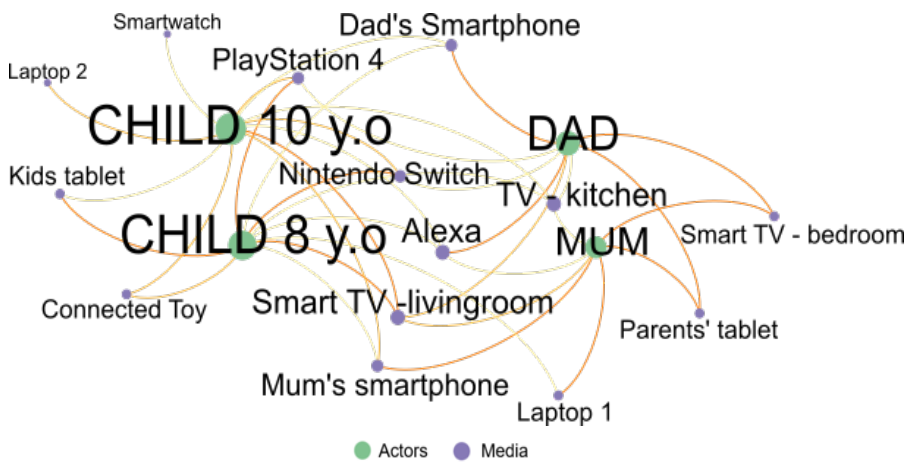
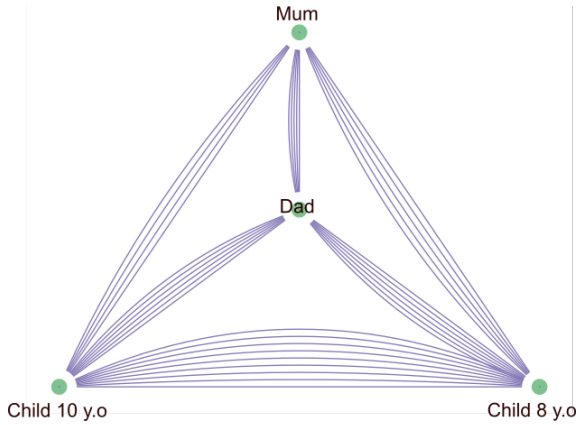


Fig. 4.1: Two-mode network of media ensemble and family members (first wave).

Note: the "thickness" of the edges is proportional to the relevance of that media practice (low-medium-high). The nodes' size and labels are proportional to their degree (number of actor-device connections).

The two-mode network shows the spatial distribution of the media ensemble and allows to visualise the patterns of spatial differentiation. The graph's right side represents the space where children can use digital media with reduced parental interference, while the left depicts parents' personal area. In the centre, the common 'public' spaces (the living room and kitchen) emerge where shared digital media (TVs, Alexa) are situated. Each actor's affective and symbolic engagement in a certain technology determines how strong the edges are. We observe that those connecting people to 'owned' and 'personal' media, which function as identity resources and means to validate status and agency within the household, are the strongest for both adults and children. In addition, the children's everyday life emerged as consistently mediatised ($k_{10y.o}$ = 11, $w.k_{10y.o}$ = 18; $k_{8\ y.o}$ = 10, $w.k_{8\ y.o}$ = 19), as they try to empower themselves by getting access to as many devices as they can, therefore overseeing a large part of the family's media ensemble:

> 8 y.o child: […] We don't use the computer very much: when the Nintendo runs out and I don't want to watch TV, I use [my mum's] laptop... I always have a backup. [laughs]
>
> Mother: Now and then she tries to get it by herself yes... And mum doesn't really want that much. Also because if she breaks that one there [the laptop]... It's not good at all!
>
> 8 y.o child: You have the phone anyway!!!



	Child 10 y.o	Child 8 y.o	Dad	Mum
Child 10 y.o	11	9	6	4
Child 8 y.o	-	10	6	5
Dad	-	-	8	5
Mum	-	-	-	7

Fig.4.2 and Table 4.1: One-mode network and matrix of family members' media-related relationships.

Note: each link represents a device adopted by both actors. The matrix describes mathematically the network: each cell reports the number of devices used in common, while the a_{ij} one shows the actor's degree, i.e the number of adopted media.

Considering the distribution pattern of the media ensemble and the media-related structure of relationships among family members (Fig. 4.2, Table 4.1), we observe that the father has a more symmetric formation, as he shares the same number of media with the children. Likewise, the two siblings use many devices in common. However, the oldest one emerged to be a little bit more mediatised in her practices (k=11), even if they are less intense (see Fig.4.1), while the youngest one shares the highest number of devices with relatives. It's interesting to notice that the mother uses less devices regularly (k=7, w.k=16) and shares fewer with children than her partner. This may suggest a specific attitude towards technology - as she defined herself during the interview as a "non-technological type" - or an under-investment due to the need to keep up with childcare as the husband comes home late in the evening and travels a lot for business. Furthermore, the father is described as fascinated by technological awe. He's particularly interested in the micro-management of the automation system enabling the smart home, such as light-settings. This sometimes generates conflicts with his partner because the mother, turning them on manually instead of by voice command, impairs their operation:

> Mother: If I do it [turn the lights on] using the switch, then Alexa doesn't listen anymore, and then my husband gets angry!

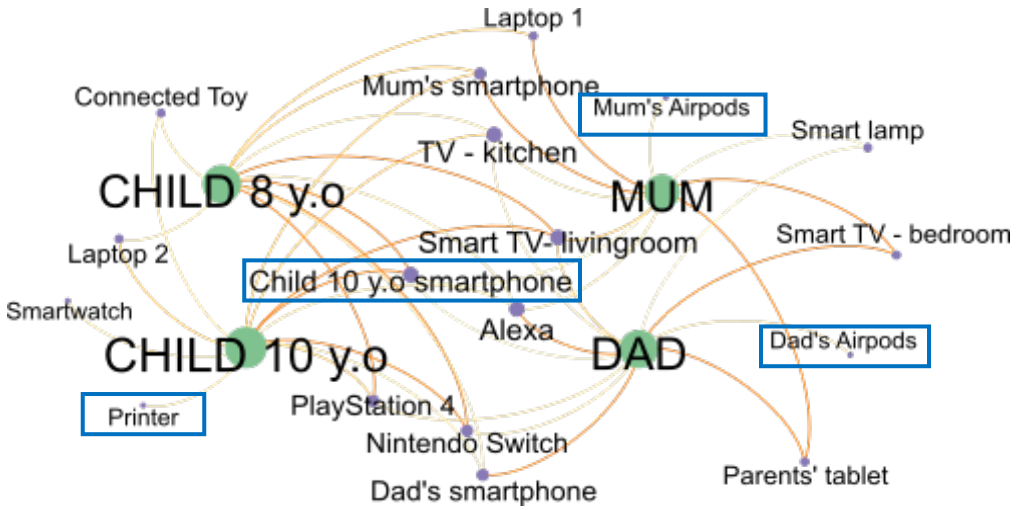
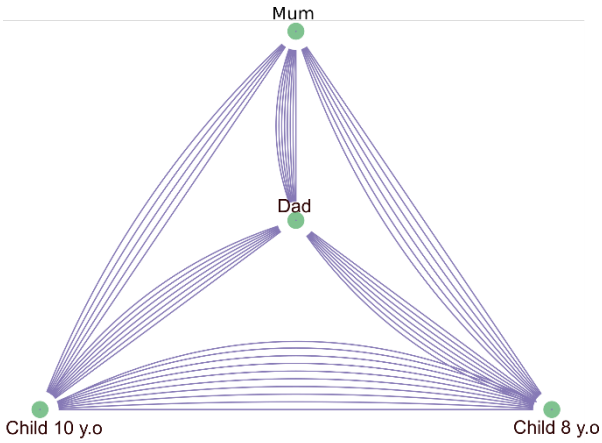


Fig. 4.3: Two-mode network of media ensemble and family members (second wave).

Note: The devices in the blue boxes represent the new entries within the media ensemble.



	Child 10 y.o	Child 8 y.o	Dad	Mum
Child 10 y.o	12	10	7	5
Child 8 y.o	-	11	7	6
Dad	-	-	11	8
Mum	-	-	-	10

Fig. 4.4 and Table 4.2: One-mode network and matrix of family members’ media-related relationships.

Actor	Measures							
	Degree (k)		*Weighted Degree (w. k)*		*Density (δ)*		*Modularity (Q)*	
	1st wave	*2nd wave*	*1st wave*	*2nd wave*	*1st wave*	*2nd wave*	*1st wave*	*2nd wave*
Child 10 y.o	11	12	18	22	0.12	0.09	0.26	0.27
Child 8 y.o	10	11	19	21				
Dad	8	11	17	19				
Mum	7	10	16	18				

Table 4.3: Degree, weighted degree density e modularity comparison between the first and second wave

During the second wave, the media ensemble enlarged (Fig. 4.2) and included a printer, mainly used for homework, two pairs of AirPods for parents (reported at that time, but likely part of the media ensemble also in the first wave), and a smartphone, previously owned by the grandfather who however didn't utilise it. The oldest sibling was given it in view of the start of middle school to keep in touch for eventual urgencies or necessities as she would travel to school alone by bus. During our visit, the mother reported that until September, the school's beginning month, the device was "everyone's". It was mainly employed during holidays in their vacation home by the sea, where the landline phone was absent. In Milan, however, the device was the elder sister's prerogative; for example, it was located in her room during the charge. The access to this device generated tensions between the sisters, as the youngest pushed to use it on regular basis. Also, negotiations between the mother and the 8 y.o, who in turn wanted her personal device for playing games and keeping in touch with her friends and cousins, were reported. This is also mirrored in the relevance of siblings' media practices involving this smartphone (see Fig. 3) and consequently in sisters' weighted degree ($w.k_{10y.o} = 22$; $w.k_{8\ y.o} = 21$).

The general increase in the media saturation level goes along with a density's small decrease (δ=0.09, -25%) and a stable score of modularity (Q=0.2) - see Table 3. This suggests how the incorporation of new devices within the media ensemble and the emergence of new media practices contribute to delineating, even if only slightly, a tetra-partite structure, where each part represents the portion of the media ensemble accessed by each family member (N=4). Conversely, the media-related structure of relationships remains pretty stable over the two waves (Fig. 4.4 and Table 4.2).

6 Discussion and conclusion

This contribution aims to advance the debate concerning the datafication on the micro-level of everyday by illustrating the value of MM-CGTM on data collected within one of the twenty families with at least one child aged eight or younger involved in a qualitative longitudinal research on the datafication of childhood and family life in Italy. In particular, we argue that framing families as communicative figurations (Couldry & Hepp, 2017; Hepp et al., 2018) and applying SNA to qualitative data within MM-CGT design can help to

materialise the media-related structure of relationships through, about, and around data that emerge in contemporary family life.

At the theoretical level, a figurational approach addresses the complex and varied ways that digital media and associated data imaginaries and practices are incorporated into everyday family life. Indeed, it shed light on the 'two-way' dynamic and nuanced process of influence by which technologies are domesticated within a figuration according to a specific culture (Silverstone, Hirsch and Morley, 1992) and, in turn, as they fit into everyday temporalities, materialities, and routines, they contribute shaping how meanings are created, eventually transforming the figuration itself (Couldry and Hepp, 2017).

Consequently, this approach entails much more than simply describing each node of a figuration separately. Conversely, it requires a 'networked perspective' that account for the complex interdependencies between actors and the culture they share, data and digital media practices, and the resulting meanings that are thereby produced (Couldry and Hepp, 2017). This set of entanglements affects the overall figuration's balance, especially because family power relations – which involve more than just actor's positioning in the constellation as they intertwine with practices supporting a certain power structure - are entrenched with data relations, that the more pervasive are the more invisible and taken for granted they become.

Along these lines, a CGT approach recognises that participants' experience of datafication is embedded in a larger context of structural, cultural, temporal, and social situations and relationships but at the same time it's situated within peculiar daily life contexts (Mascheroni & Siibak, 2021). Hence the everyday, as central for social construction (Silverstone, Hirsch, and Morley, 1992; de Certeau, 1984), represents a privileged perspective of observation on datafication and thus constitutes a significant analytical entry-point for empirical research. The flexibility and thick description offered by CGT indeed provide in-depth knowledge, from the actors' viewpoints, of the continuous and dynamic meaning-making they are engaged in during everyday digital practices (Charmaz, 2014).

In particular, MM-CGTM appeared suitable to build a prismatic understanding of datafication of family life and to promote analytical density (Fielding, 2012) as it encompasses not only different data collection procedures but also analytical perspectives. Applying SNA on qualitative longitudinal data - via a conversion design that transforms observations and interviews codes in network entries– shows many potentials.

First, it can describe the pattern of connections between family members who engage in particular media practices - each with its own goals and modalities - that are spatially distributed within the home and domesticated in accordance with a specific culture (Widmer, 2021, 2016). Our findings highlight how two-mode networks of actors and the media ensemble enable the identification of the most relevant actors and devices through degree (i.e number of actor-device connections) and weighted degree - that incorporates also the emotional, affective, or relational investment on specific media (see Methods section). In addition, density (which estimates the media ensemble's adoption level expressing it as the percentage of actor-device connections) and modularity (that accounts for the network tendency in articulating in separated but still connected areas) inform about the figuration structure. As reported by our analysis, the slight density decrease and the stability of modularity score (although not so high) over the two waves suggest an n-partite articulation (where n represents the number of family members) that discloses diverse 'areas of competence' or even territories (Morley, 1986). This expresses on the one hand that diverse skills and interests enact different practices (like the father who is interested in the smart home automation system via Alexa), on the other, that the media ensemble distribution is mobilised to negotiate or confirm the roles and power balance. Indeed as the

analysis of gender relations in families has demonstrated (Morley, 1986), power within them correlates with the disposition of certain technologies as it is inscribed in the media ensemble.

Furthermore, two-mode networks enable to glimpse spatial differentiation patterns. In our case study, a topology seems to emerge, where the central part of the graph depicting the household's public spaces (living room, kitchen), in which devices are shared among members, stands in contrast with the external zones where actors articulate practices through 'personal' and 'owned' media, whose use is sometimes forbidden to the other relatives, especially to children. In addition, the one-mode networks disclose the media-related structure of relationships among family members starting from shared devices. The formation's symmetry (and eventual lack of) informs about the distribution of the media ensemble among actors of the figuration, thus revealing gendered and generational trajectories not immediately evident. Therefore, these aspects emerging from the spatial surface of everyday life (Couldry and Hepp, 2017) represent a salient dimension of analysis to materialise the taken-for-granted entanglements between data, practices, and imaginaries.

Moreover, the networks' visual properties together with their metrics can be integrated with interviews' qualitative findings to build typologies (Bellotti, 2015), that can also include other dimensions, such as parents' media literacy, socioeconomic status, parental mediation style, values, interests, norms and imaginaries about technology. In this regard, the development of cases allows researchers to reconnect segments to the general context (Cronin et al., 2008): indeed each family (N=20) represents a case study that dialogues with the others throughout the research. As noted by Bazeley (2018), the case-based analysis provides the lynchpin for data integration within mixed methods studies, that in MM-CGTM occurs iteratively as the analytical process proceeds.

Furthermore, as the remaining seventeen families will be analysed by adopting the same procedure - refined and improved in light of this first application - a comprehensive comparison across the sample will be led. Moreover, this combination of methods will be applied to the longitudinal data collected during all three waves to account for the evolution of family figurations over time and concerning new devices in the digital media ensemble.

Another relevant potential of applying SNA in MM-CGTM is the heuristic value of visualisations, aspect still little investigated particularly in mixed methods research (Plano Clark and Sanders, 2015). The networks' visual display not only represents what has been discovered but also provides a strategy to help the analyst generate new analytical and theoretical insights (Buckley & Waring, 2013; Shannon-Baker & Edwards, 2018). Thus, they can contribute to developing as well as supporting the conclusions of a study (Maxwell, Chmiel & Rogers, 2015), which is consistent with Charmaz's emphasis on CGT as a methodology for theorizing (Creamer, 2021). Moreover, they partly intersect with situational analysis (Clarke, 2021) as the networks map the constellation of actors, media ensemble and practices within a given figuration. This approach allows situating data practices and framing datafication as a process (Mattoni, 2020).

In addition, the networks' visualisations were used as a stimulus to encourage reflexivity among both participants and researchers. In the first instance, in line with the iterative and comparative principles at the core of CGT, the networks and relevant metrics fostered researchers to reflect on not immediate aspects of practices and imaginaries concerning digital media and data in everyday life.

In the second case, the visualisations allowed participants to engage with data relations in the digital-material context of their daily lives (Costanza-Chock, 2018; D'Ignazio and Klein, 2019). In fact, they were used as "reflexive maps" during the third and final family visit to provoke conversation on the family media-related structure of relationships and its

evolution over time, as well as the changes in the media ensemble, routines, practices, and even rules concerning usage. As researchers and interviewees conversed while getting feedback, the maps served as a tool for knowledge co-construction by putting in dialogue disparate viewpoints on the findings and their articulation. Additionally, they can be seen as a form of participatory research (Vaughn and Jacquez, 2020) and a means of evaluating the effectiveness and epistemological value of this MM-CGT design. These aspects are consistent with CGT's emphasis on reflexivity, theory building, and critical inquiry (Charmaz & Thornberg, 2021).

In conclusion, this set of applications illustrates how the mix of different data and analysis techniques can help materialise taken-for-granted aspects concerning data relations in everyday life. Despite this, some limitations need to be addressed. First, at this stage, the 'content' of media practices is not incorporated within this analysis, however, it represents a step that is being parallel implemented (see Amadori & Mascheroni, 2023). In particular, we employ the classification by Couldry (2012, p. 35), which distinguishes three kinds of media-related practices (*media-oriented*, *mediated*, and *media-conditioned*), to account for the diverse orientation and meanings of everyday media activities that impact the family figuration.

Moreover, if on the one hand network methods help to structure and metricise some patterns of family figurations (consequently facilitating modeling and standardised comparison), on the other they don't aim to replace the 'traditional' techniques well-known for their analytical richness. The core of this methodological proposal - even though illustrated here only on a case study - is indeed the integration of both data collection and analysis procedures to bring a new perspective of observation to study datafication of childhood and family life at the micro-level of daily life, in order to partially fill the gap in the field (Flensburg & Lonsborg, 2021). In addition, this method might be applied to other contexts to better understand how data relations reshape various communicative figurations. In fact, this strategy aims to emphasise the situatedness of data practices and imaginaries while also addressing the relevance of spatial articulation of media (Morley, 1986, 2000) and create new tools for the empowerment of research subjects (Costanza-Chock, 2018; D'Ignazio and Klein, 2019) to enhance the phenomenological richness of data practices in the diverse digital-material contexts of family life.

7 References

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