Doppelganger as method: a framework for examining datafication

Abstract

This paper explores an emerging methodological approach called doppelganger as method. This method uses the idea of a doppelganger or double to explore the social world. It is specifically used to examine datafication, or the increase in the production and use of data and its impact on education. Doppelganger as method begins by locating doubles, finding that doubles of the child and teacher are created through the focus on data production in early childhood education. It then asks how this doubling operates as an instrument of power, using understandings of the literary genre of the doppelganger along with its psychoanalytic interpretations to formulate novel interpretations. Doppelganger as method has been used as a tool to reconceptualize datafication, the increase in the volume and use of data in educational contexts. Using interpretations of Freud's work on the uncanny, a psychoanalytic understanding of the doppelganger is established. This is then applied in an educational context to interpret the function of various doppelgangers. Findings from this method include an ambivalent relationship with data, the marginalization of bilingual children and changes to both teacher and child subjectivity.

Introduction

This article considers doppelganger as method, a methodological approach, which is currently being developed, to meditate on the nature of datafication. The paper's aim is to outline how this method has developed and how it can be used to understand datafication in an educational context. It takes the idea of the doppelganger, or double, as a conceptual tool to examine situations in which there is conflict and division. It has been utilised to examine datafication as an example of an arena in which conflict dominates. Doppelganger as method seeks to identify where a doubling has occurred and how this double functions as a technology of power to alter subjectivity and change pedagogy.

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Datafication is defined as "the transformation of part, if not most of our lives into computable data" (Cheney-Lippold, 2017: 9). Bradbury and Roberts Holmes define datafication in terms of "increased significance, visibility and constant governance through dataveillance" (Bradbury and Roberts-Holmes, 2017: 6). Bradbury (2021) explores this further, within the English context, arguing that datafication changes the five Ps of pedagogy, practice, priorities, people and power. She explains that datafication changes pedagogy as the focus of teaching becomes gathering data rather than interacting with children. It changes practice in terms of the grouping of children according to data analysis. Priorities are altered as data production is prioritised over other teacher tasks and these in turn lead to changes in people as data -driven subjectivities transform both children and teachers. Finally, the workings of power are changed as datafication is central to the neoliberal process in which the school is transformed into the market.

Doppelganger as method is used to develop new understandings about situations in which there is division or conflict. It always seeks to answer questions about where a doubling has occurred and how this functions to regulate individuals and society. Doppelganger as method first identifies a doubling. The replication is usually referred to as a *doppelganger* rather than a *double* or *second self* because the term *doppelganger* emerges from the Gothic genre and its context within this genre is used in the analytical process. Following the identification of a duplication, questions are asked about the doppelganger which are influenced by psychoanalytic interpretations of the doppelganger genre. Often, doppelganger stories are used as analogies to aid understanding, but the focus is on the psychoanalytic interpretations of these stories more than the literary analyses. The main focus is on the doppelganger as an aspect of the uncanny, which

Freud (1919) explores in his text of the same name. The formulation of research questions within doppelganger as method uses aspects of the uncanny such as the doppelganger as an aspect of all three parts of Freud's second model of the psyche. It takes the functions of the doppelganger in psychoanalytic analyses and transposes them onto the social world. These interpretations of the doppelganger genre will be explored below, with each aspect of the uncanny analysed and its use in doppelganger as method research exemplified. Prior to this however, an explanation of the emergence of the approach, with some of its key influences will be outlined, to give a context to its later application.

The emergence of doppelganger as method

The interest in the concept of a double or second self began with an experience of being a preschool teacher in England. A feeling of extreme discomfort arose from the amount of data being collected about children and the importance of this data in practice. The need to collect data appeared to be driving pedagogy, sometimes at the expense of the needs of children. A feeling of dissonance arose, resulting from a sensation of being pulled between two very different discourses of early childhood education, one which focused on the needs of the child and the other which grew from the requirement of the school to produce and analyse data.

The early years pedagogy embodied in the Statutory Framework (the framework for those working with children aged birth to five years) of the time (2014) (Department for Education, 2012) contained four overarching principles. These were: every child is unique; children require positive relationships with those around them; children learn and

develop in enabling environments and "children develop and learn in different ways and at different rates" (3). These principles, which are still present in the current framework, are based on a child-centred ideology where the unique child, rather than the curriculum is the focus of teaching. Alongside these principles, however, is a requirement to assess all children at the age of five against a number of early learning goals. This statutory assessment is conducted in all settings in England and the results are reported to the UK Department for Education (DfE) (Department for Education, 2012). Focusing on the needs of each child felt incompatible with focusing on the early learning goals as one approach was child-led while the other was led by the requirement to produce data for the school. As a key performance indicator, the data produced from the end of phase assessment (Early Years Foundation Stage Profile) was used to make judgements about the quality of the early years provision (Standards and Testing Agency, 2014). It was also collated by the DfE and published nationally. The requirement to produce the right kind of data conflicted with the requirement of the framework to focus on the unique child, which led to a deep sense of unease. This was later conceptualised as a divided self, with one self focusing on data production and another focusing on the needs of the child (Pierlejewski, 2023).

The development of the double in research literature

The idea of a double is not unique and has been developed by a number of authors within a range of academic disciplines. Poster first introduced the term "data-double" in his (1990: 97) work on the impact of electronic communication. He defined the data-double as "the multiplication of the individual, the constitution of an additional self" (97). This was further explored by Haggerty and Ericson in their paper about the development

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of surveillance in the face of the development of technology (2000). Using Deleuze and Guatarri's concept of the assemblage, they conceptualize surveillance as an assemblage of multiple forms of surveillance. These surveillance assemblages then extract data from the individual, reassembling them in different locations as a new data-double. Simon (2005) builds on this, also using the work of Deleuze and Guattari to explore the idea of the data-double as a "dividual" (Deleuze, 1992 in Simon, 2005). He suggests that rather than a society of discipline, which Foucault defined as being regulated through enclosure, we now exist within a society of control, in which the information about an individual, rather than the individual themselves is acted upon.

The insertion of the data-double into the arena of education was proposed by Williamson (2014). He introduced the term "data-doppelganger" to describe the process by which children are separated into multiple pieces of data and then reassembled within the database as a data-doppelganger (1). This other version of the child is then the focus of constant intervention with each data-doppelganger, "continually being calculated, classified, and acted upon in order to make their individual data profile fit regional, national and global educational data standards" (12). Bradbury and Roberts-Holmes (2017) build on this, discussing the production of the data-double as a reductive process, as the complex nature of the child is reduced to a number.

The influence of child as method

One of the key influences on the development of doppelganger of method was Burman's child as method (Burman, 2018, 2019, 2022, 2023). Child as method is a research analytic which focuses on the construction of the child or childhood within the geopolitical world and asks how this operates as a technology of power. Hegemonic

discourses of childhood determine what can and cannot be said about the child. In the global north, they uphold notions of developmentalism, establishing norms of childhood which both exclude and marginalise. In the most simple terms, child as method examines the story of child/childhood and asks how this functions.

There are several key aspects of this approach which Burman outlines in her (2022) paper. These will be examined in turn, discussing how each aspect has been built upon. Firstly, child as method draws from a range of disciplines. Burman notes that 'embodied historical experience' (Burman, 2022: 3) always informs methods and theories. Doppelganger as method also exists in relation to other disciplines. It draws on literature and film studies in its exploration of the doppelganger genre. It also uses psychoanalysis, examining psychoanalytic studies of the doppelganger genre as well as the work of Freud and Lacan. Another aspect of child as method is that it challenges developmentalism, asking what it might mean to view childhood from a non-normative stance and in so doing, denaturalising approaches to the notion of child. Doppelganger as method also challenges developmentalism through questioning the norms against which children are measured to produce the data-doppelganger. Finally, child as method looks at children's positions within the social and political world, seeing the child as both producing and being produced by geopolitical discourse. Doppelganger as method examines positions created by datafication asking how these produce and are produced by discourse.

Interpretations of the doppelganger and their use in research

Within literature and film, there exists a well-developed genre of the doppelganger. This began as a feature of the gothic, which emerged in the eighteenth century with stories of fear and haunting. Notable texts from the nineteenth century such as Dostoyevsky's *The Double* (1846) Edgar Allen Poe's *William Wilson* (1850) and Oscar Wilde's *The Picture of Dorian Gray* (1891) developed this further. During the twentieth and twenty-first centuries, this has been extensively explored in film and TV with examples being *Fight Club* (Fincher, 1999), *The Matrix* (The Wachowski Brothers, 1999) and *The Double* (Ayoade, 2013). All of these stories involve encounters with a doppelganger and explore the resulting impact on the main character. Doppelganger as method has drawn on the features of the doppelganger genre to develop an understanding of how the double operates along with its psychoanalytic interpretations, which will be explored below.

The uncanny

Doppelganger as method uses the term *doppelganger*, which is a German word meaning "double walker". In essence, a doppelganger is another, familiar yet strange version of you. Associated with this term is Freud's notion of *unheimlich* or uncanny (Freud, 1919). Freud notes that *heimlich*, meaning *homely*, can also mean *secret* or *hidden* because comfortable homely things are hidden from the outside world. Over time, the notion of something hidden from the outside world became *dangerous* or *occult* so that the meaning of *heimlich* became more ambivalent meaning the same as its antonym, *unheimlich* (Dolar, 1991). The uncanny, in Freud's work, is something which should remain secret, something which has been pushed into the unconscious, but has come out into the open. It is both familiar and strange, something that we should be comfortable

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with, but which has become eerie or frightening. This can be seen in the example of the doppelganger, which Freud discusses in his (1919) paper, as the doppelganger is both familiar and frightening. The self should remain hidden within the unconscious but has somehow emerged into the outside world. The concept of the doppelganger being something hidden which has escaped into the world outside the mind, so familiar and yet uncanny is not associated with other terms denoting replication.

The idea of the doppelganger, as an example of the uncanny, has been used as a metaphor to conceptualise the data-doppelganger of a bilingual child (Pierlejewski 2020a). In this example, a vignette of a bilingual four-year-old child is used to exemplify the process of datafication in early years classrooms in England. The large amounts of data collected about the child in the form of assessments, observations, photographs, learning journals, notes, checklists and tracking data form a doppelganger of the child. This data-doppelganger does not simply consist of the numerical data entered into the digital tracking system. It is the qualitative as well as the quantitative data about the child which form the basis of the teacher's professional knowledge. This data-doppelganger consists of multiple measurements against educational norms embodied in the early learning goals (Department for Education, 2017) and its associated non-statutory guidance document *Development Matters* (Early Education, 2012) which outline the educational and developmental expectations of early years children. Using the idea of the doppelganger as uncanny provoked questions of "how is the doppelganger uncanny?" and "how does it compare to the embodied child?". The doppelganger was found to be familiar as it consisted of vast quantities of evidence based on observation and assessment (which is seen as authentic) but strange as it presented a distorted picture of

the bilingual child. The lack of contextual information and the assessment of communication using the medium of English (rather than the child's home language) resulted in a doppelganger which was decidedly uncanny. It is described as a "shadowy" and "incomplete" doppelganger, missing significant aspects of communication development and giving a deficit representation of the child (Pierlejewski, 2020a: 263). An aspect of doppelganger as method then, is to interrogate interpretations of the doppelganger genre and apply aspects of them to the social world, giving rise to new kinds of questions which lead to original ways of seeing.

Freud's (1919) concept of the doppelganger as something which is hidden but has somehow emerged into the outside world has also been utilised as a thinking tool. An exploration of this aspect of Freud's work on the uncanny prompted questions asking what had been hidden but was now revealed. In the same paper focusing on the bilingual child (Pierlejewski, 2020a), the examination or assessment of the child is described as a process which makes the invisible visible. The method of collecting evidence for the assessment against the early learning goals requires teachers to convert every aspect of the child's life into writing as they record observations, make checklists and create records of learning. What was once simply the child's nature is externalised and recorded. Foucault describes this process as one which captures and fixes the child in a network of writing (Foucault, 1977). The process of datafication thus reconstitutes the individual as a "describable, analysable object" (Foucault, 1977: 190). This describable, analysable object is the data-doppelganger, a second version of the child which determines how they are seen in the school setting. It is the data-doppelganger which will be used by the teacher to make pedagogical decisions. These were found to be based on

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Gillborn and Youdell's (2000) notion of educational triage, where children were categorised as being at the level expected, almost at the level or "no hopers" (Pierlejewski, 2020a: 259). Those whose data-doppelgangers were well below the norms did not receive the support from the teacher they required. Interestingly, it could be argued that the data-doppelganger of the child is extracted by the teacher without the child's consent. It is therefore not produced by the subject but by the teacher. It is almost as if the process of revealing what is repressed and hidden is reversed with the physical subject repressed rather than the data-doppelganger: from the point of datafication, data-doppelgangers could be seen as the primary subjects and the real physical subjects the uncanny surplus that remains, the reminder that people are not just data. In addition to Freud's psychoanalytic work on the doppelganger there have been a number of other psychoanalytic and literary evaluations of the genre which have developed the concept of the doppelganger. Examples are Rank's analysis of the doppelganger genre, *Double: a psychoanalytic study* (1971), Tymms' (1949) work, which also focuses on the double in literary psychology, Keppler's work on the literary genre of the doppelganger (Keppler, 1972) and Dolar's paper on Lacan and the uncanny (1991). The study of these works reveals aspects of the doppelganger which were then used to formulate questions about the social world of early years education and are exemplified below.

Narcissism

Rank's (1971) work on the doppelganger genre is written from a psychoanalyst perspective. His work focuses on the psychoanalytic concept of narcissism, in which the love of the self is inextricably linked to the fear of death. This association of love and fear results from the connection between narcissistic self-love and the fear of self destruction

(death) which accompanies this love. The concept is exemplified very well in Oscar

Wilde's *The Picture of Dorian Gray* (Wilde, 1891). In this story, the young man Dorian

asks his artist friend to paint a picture of him. He becomes infatuated with the image as

he is infatuated with his own beauty and, unable to bear the thought of the loss of his

youth, suggests that he would give his soul for the picture to age instead of him. As a

result of this, the picture gradually becomes increasingly horrific while Dorian retains his

youthful beauty. The deterioration of the painting reflects Dorian's moral decline and

represents his conscience or soul. The ambivalent relationship with the doppelganger,

which is seen in other doppelganger stories such as Poe's *William Wilson* (1850) and the

cult film *Fight Club* (Fincher, 1999) was used to explore the impacts of datafication on

teacher subjectivity.

The doppelganger text used as an inspiration for an exploration of teacher

subjectivity (Pierlejewski, 2023) was a book about the relationship between Einstein and

Bergson (Canales, 2015). In this text, in which the author compares Einstein and

Bergson's notions of time, the two main historical figures have much in common,

meaning that they can be conceptualised as doppelgangers. This text was used to explore

two different aspects of the teacher role: the teacher as physicist, which was also termed

the "data teacher" (525) and the teacher as philosopher, also called the "true early years

teacher" (525) meaning the teacher who focuses on meeting the needs of the child. The

paper reports findings from a participatory action research (PAR) project which took

place over one year in a reception class (ages four to five) in a school in England. The

PAR team, consisting of the researcher working as a teacher in the school and staff

planned actions which included implementing a new child-led approach to teaching

called *In the moment planning* (Ephgrave, 2018). The aim of the study was to find ways to resist datafication within an early years school context.

A finding of this study was that teachers and the researcher expressed feelings of dissonance and incongruity. This is exemplified by the class teacher who referred to her feelings about reporting to parents on their child's progression thus: "I feel like two different teachers. Morally, it's not sitting right with me" (Pierlejewski, 2023: 527). In this statement, she was expressing her unease at discussing assessment data with the parents of children who had "good" data but omitting this part of the feedback when talking to parents whose children did not achieve well in their assessments. Both the class teacher and the researcher were aware of a split in their subjectivity which resulted from operating within two opposing discourses. These were described as the discourse of performativity, in which producing good data was the purpose of education and the discourse of child-centred education in which the purpose of education was to nurture the individual child. An awareness of the teacher doppelganger was made explicit in these discussions, which led to the focus of teacher subjectivity.

Using Rank's notion of the ambivalent narcissistic relationship with the doppelganger prompted questions of how the teacher functioned within each role and how these two selves operated simultaneously (Pierlejewski, 2023). This led to findings that at times the participants narrated themselves as loving data. An example of this is a reflection by the researcher: "I love analysing data!" (524). This was conceptualised as the "joy of data" (524) and expressed a love for the doppelganger teacher as physicist. It explored the joy which the teacher felt when analysing data and finding that the data told a positive story about pupil progress. This love of the doppelganger is also discussed in a

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previous paper (Pierlejewski 2020b) in which the formulation of good data is described as the primary aim of the teacher. The act of formulating good data is described as "the polishing of the teacher's doppelganger" (7) and can be seen as an act of love towards the doppelganger.

At other times, a fear of data and the data-self is expressed, with the researcher reflecting, "I can't escape it. I am trapped by data. It impacts on who I am and makes me something else" (527). At this moment, the researcher narrated themselves as feeling unable to resist datafication and losing their autonomy as a result of this. It changed who they were and made them something else (a doppelganger). Exploring this uncomfortable notion of the split self led to a conclusion that only an acceptance of the doppelganger was possible. Rank discusses the notion of the doppelganger being an aspect of the ego and that in many stories, to kill the doppelganger is to kill the self (Rank, 1971). Many protagonists such as William Wilson (Poe, 1850) and Dorian Gray (Wilde, 1891), attempt to kill the doppelganger and in doing so, kill themselves. This links with his discussion of narcissism as the fear of death associated with the love of the self can result in a death wish as death is the only way to overcome the *fear* of death. As early years teachers in England operate within two opposing discourses, the research concluded that to completely reject one discourse and try to operate as a coherent subject would be equivalent to trying to kill the doppelganger. In order to care for the self, it argued, the divided subject must be accepted.

The uncanny, as a concept, is also explored extensively by Dolar in his (1991) paper which predominantly focuses on a Lacanian interpretation of Freud's work. He describes the uncanny as "the dimension where all the concepts of psychoanalysis come

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together" (5). Of particular interest in terms of doppelganger as method are his exploration of the doppelganger as standing for all three aspects of Freud's second model of the psyche and his analysis of the role of Lacan's mirror phase in the uncanny. The influence of both will be discussed below, beginning with the model of the psyche.

Freud's second model of the psyche

Dolar (1991) uses Lacan's theory of the mirror phase, in which the discovery of the other in the mirror reflection leads to the establishment of the subject as "I" to determine that "my 'ego-identity' comes from my double" (12). He argues that the double must stand for each of the three aspects of Freud's second topic, as together these create the ego. He explains the doppelganger's role thus:

> He constitutes the essential part of the ego; he carries out the repressed desires springing from the Id; and he also, with a malevolence typical of the superego, prevents the subject from carrying out his desires-all at one and the same time. (Dolar, 1991: 12)

A simple definition of Freud's second topic is that the id represents the chaotic primal drives and impulses, the superego is an extension of the ego which seeks to control the id and the ego is the middle ground between the id and the superego: the resulting "I". This interpretation can be exemplified in the doppelganger story, *William Wilson* (Poe, 1839). In this short story, the protagonist William Wilson meets another boy who looks exactly like him and bears the same name. After initially liking the boy (named Wilson in the book), William begins to hate him and tries to avoid him at all costs. Later in life, William pursues a life of debauchery and Wilson appears periodically to try to prevent William acting out his darkest desires. The story ends with William attempting to murder

Wilson, but in doing so, he murders himself. Using Freud's second topic, Wilson can be seen as an essential part of the ego because without him, William cannot exist. In this story, it is William, not the doppelganger, who carries out the repressed desires of the id when he chooses a life of debauchery. Finally, Wilson acts as the superego, trying to mediate the id and prevent William from acting out his desires.

This story, and the psychoanalytic interpretation of it were used to understand the impact of datafication (Pierlejewski, 2020b). In this text, the object of analysis is a document produced by the English inspectorate, the Office for Standards in Education, Children's Services and Skills (Ofsted) into "good practice" in reception (the final year of English early childhood education) (Ofsted, 2017). Following the identification of a data-doppelganger in the text, formed from the data collected about both children and teachers within the English early childhood education (ECE) system, the psychoanalytic interpretation of the doppelganger found in Dolar's paper, along with the exemplification of the story William Wilson (Poe, 1839) were used to formulate the following questions:

How does the data-doppelganger complete the ego?
How does the data-doppelganger reveal the repressed desires of the id?
How does the data-doppelganger regulate the subjects?
(Pierlejewski, 2020b: 6)

These research questions provided a unique lens through which to view the data and led to a number of novel findings.

The function of the data-doppelganger to regulate subjects as the superego revealed changes to pedagogy as approaches which did not directly lead to the collection of data were not valued. Direct teaching was promoted as the main approach with descriptions of one directional teaching promoted over play-based learning. The role of

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the superego is to regulate the id, which consists of a chaotic mass of irrational impulses and desires. The influence of the id could be seen in the suppression of play, which, as a chaotic and unmeasurable concept, could be conceptualised as being id-driven. In the story of *William Wilson* a game of cards is symbolic of the degenerate, id-driven behaviour of the protagonist and must be stopped by Wilson, acting as the superego. In the same way, the data-doppelganger in the form of the drive to collect data for accountability purposes steps in to stop the games (a form of play) which are a usual feature of ECE pedagogy.

Finally, influenced by Dolar's (1991) account of Lacan's mirror phase, a mirror of data is conceptualized, which acts to reflect an alternative view of the child. Just as the ego is formed when the mirror image is seen for the first time, the child's subjectivity is altered when they first become aware of how they are viewed by others within an educational context. Prior to entering education, the child may not be aware of what they do not know. Their subjectivity is based on relationships within the family environment rather than school expectations (Burman, 2017). The act of assessing a child to collect data against given targets reveals the unknown unknowns to the child. They realise what they cannot do and in this process, start to see themselves as the teacher sees them, in comparison to expectations and norms. This mirror of data produces a new subjectivity in the child: a subjectivity which is part data, part child. In this way, the paper argues, the encounter with the mirror of data (a data-doppelganger of the child) completes the child's ego.

Shadows and reflections

Dolar's (1991) and Rank's (1971) work on reflections and shadows both focus on the parallel between the doppelganger and the soul. Rank argues that the first doppelganger is the soul, which arises from the fear of death as it is an aspect of the human which can live on after death. Dolar also argues that the mirror image can survive the body due to its immateriality which leads to his claim that "reflections constitute our essential selves" (Dolar, 1991: 12). This notion of the doppelganger being the essential self can be seen in the film Fight Club (Fincher, 1999), where the narrator's alter ego Tyler Durden becomes more and more powerful, resulting in the narrator shooting himself in the head. This suggests that it is Tyler Durden who had become more real than the narrator.

The notion of the shadow is developed in a paper which focuses on the impact of a new curriculum for initial teacher education (ITE) in England (Pierlejewski, In Press). This article uses doppelganger as method to identify a doppelganger of the ITE curriculum. It argues that there are two curricula present: the authorised curriculum, which is embodied in the ITT Core Content Framework (CCF) (Department for Education, 2019) , a new national curriculum for ITE in England, and the other, a shadow curriculum, which can be found in the omissions of the CCF. The CCF can be seen as a product of datafication as it is used as a norm against which teacher education in England is measured. The omitted and marginalised aspects of initial teacher education, although invisible in the CCF, form the basis of a doppelganger curriculum. The paper argues that this curriculum is located within the cracks of the CCF, where small opportunities for deviance from the authorised curriculum occur. It is also found in undocumented classroom interactions away from the surveillance of the regulatory bodies. This shadow

curriculum appears to be less substantial than the authorised curriculum as it is so marginalised. For many teacher educators however, this curriculum is the soul of teaching. A psychoanalytic interpretation could propose that the shadow curriculum has emerged out of a fear of death as recent changes to ITE in England have led to the closure of several courses and the "death" of ITE at these institutions. The shadow curriculum could be seen as the "essential self" of initial teacher education as it is the curriculum which teacher educators value and will teach despite the exceptionally tightly regulated and controlled system operating in England at present. The shadow curriculum therefore resists a datafication discourse which defines quality as meeting the norms of the CCF.

Conclusion

Doppelganger as method uses psychoanalytic interpretations of the doppelganger genre to produce a unique approach to analysing the social world. Questions are formulated based on an understanding of the literary genre and its accompanying psychanalytic analysis. This approach develops the idea of a doppelganger, building on previous conceptualisations of doubling, and exploring notions of identity and subjectivity. The questions asked about the role of datafication, which are embodied in questions about the doppelganger, present a unique lens through which to view datafication. These questions have shed new light on how datafication impacts on child and teacher subjectivity, how children can be disadvantaged through datafication, the impact on pedagogy and opportunities for resistance. There is more work to be done, however. The work of Freud (1919), Rank (1971) and Dolar (1991) on the uncanny and its related notion of the doppelganger are by no means exhausted, and there is much scope for a re-examination of these texts with a resultant application in a range of contexts.

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