



Associations between Specific Learning Disorder (SLD) and Attention Deficit Hyperactivity Disorder (ADHD): A case report.

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ABSTRACT

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Specific Learning Disorder (SLD) and its comorbid, attention deficit hyperactivity disorder (ADHD), are taking their toll on school children in Nigeria. Teachers and learning professionals are beginning to identify children with these learning problems. Children with these problems face many difficulties with their peers, teachers in school, their neighbours, and siblings at home. These difficulties border around low academic attainment, deficits in interpersonal relationship skills, perceived lack of acceptance, alienation, demoralization, low self-esteem, psychological distress, and poor overall mental health. Their academic, social, emotional, global self-concepts and psychological well-being are also affected. This case report explores the associations between SLD and ADHD in a 12-year-old school child (*Obi) who presents with SLD and ADHD comorbid symptoms and describes his experiences, difficulties, and progress throughout treatment. Observations, interviews, and psychological tests were used to obtain information from the client, his parents, and teacher. Result of observations and interviews revealed that Obi experiences difficulties in reading, written expression, and mathematics. Obi's overall performance in the subtests of Wechsler Intelligence Scale for Children (WISC-IV) was very poor. His scores on the SNAP-IV Teacher/Parent rating scale revealed that he has ADHD (inattentive type, C-In =1.11). It was also revealed that both teratogens and cultural factors may have contributed to his difficulty. Findings showed that Obi's mother's use of a substance during pregnancy could have contributed to the development of Obi's SLD, ADHD, or both. With guided discovery and support from Obi's parents and teachers, and with consistent follow-up and evaluation by clinical psychology interns posted to Obi's school, Obi can improve

*This is not the real name. It was used to maintain confidentiality.

The Diagnostic Statistical Manual of Mental Disorders (DSM 5) merged the different axes of learning disorders in DSM-IV-TR including Reading Disorder, Mathematics Disorder, Disorder of Written Expression, and Learning Disorder Not Otherwise Specified into Specific Learning Disorder (SLD) in DSM 5 with specifiers for impairment in reading, written expression, and Mathematics (American Psychiatric Association, APA, 2000, 2013; Poletti, 2014). Specific Learning Disorder is a neurodevelopmental disorder characterized by persistent difficulties in learning and using academic skills that cannot be accounted for by intellectual disabilities, impaired vision or hearing, inadequate educational instruction, or lack of proficiency in the language of academic instruction. There could be impairment in reading, spelling, writing, and Mathematics which could be mild, moderate, or severe (APA, 2013). Difficulty in reading is often referred to as dyslexia, difficulty in writing is often referred to as dysgraphia, while difficulty in Mathematics is referred to as dyscalculia (APA, 2013; Karande et al., 2007).

Specific Learning Disorder is first recognised during elementary school years when children are required to spell, read, write, and learn Mathematics. In most cases, however, it can be noticed in preschool years if there are early speech impairment (Siegel, 2006), motor impairment and delays in attention (APA, 2013). Early identification of SLD symptoms and subsequent

diagnosis is necessary in the intervention process.

Studies show that children with SLD perform poorly in some Wechsler Intelligence Scale for Children (WISC-IV) subtests (Giofrè, et al., 2016; Poletti, 2014). In a study conducted in Italy which compared 172 children with SLD with 74 controls, Poletti (2014) found that children with SLD have worse performances on Similarities, Digit Span, Letter-Number Sequencing, and Coding subtests. Giofrè et al. (2016) however found that for the Digit Span subtest, children with SLD had more difficulty with forward span than backward span in a study of 318 children that had difficulties with working memory. This supports the theory that models of multiple cognitive deficits are the basis for Specific Learning Disorder. Korkman and Pesonen (1994) also reported that children with SLD were impaired in phonological awareness, verbal memory span, storytelling, and verbal IQ which explains linguistic impairment, especially in reading and spelling.

Among Nigerian children, Adelekan et al. (2014) found significant differences in WISC-III scores between children with SLD and their typically developing peers. Children with SLD performed poorly in Arithmetic, Coding, and Symbol Search subtests. Similarly, Olowu and Olowu (2015) reported that Nigerian children with SLD scored lower on WISC-IV subtests, particularly in Perceptual Reasoning Index (PRI) and Processing Speed Index (PSI). Ibukun and Olubiya (2017) also found

significant correlations between SLD symptoms and poor performance on WISC-IV subtests, including Digit Span, Coding, and Symbol Search among children in Lagos, Nigeria.

Causes/Risk Factors

Specific Learning Disorder has been linked to environmental factors including low birth weight, oxygen deprivation, premature or prolonged labour, prenatal exposure to nicotine as well as genetic factors since an individual is at risk of having SLD if found in first degree relatives (Siegel, 2006; Cortiella, 2009). Armstrong (2010) reported that functional Magnetic Resonance Imaging (fMRI) scans show that the word-analysis area in the parieto-temporal region and word-form area in the occipito-temporal region of the brain have less blood flow in individuals with SLD when compared to individuals who do not have the disorder. This reduction in blood flow in the left hemisphere is often accompanied by increased activation in the right hemisphere (Armstrong, 2010). The atypical activation patterns observed in individuals with SLD suggest that the right hemisphere may assume functions usually dominated by the left hemisphere, potentially as a compensatory mechanism (Armstrong, 2010; Richlan, et al., 2009). However, this shift does not necessarily result in superior right hemisphere capabilities compared to individuals without SLD, instead, it reflects an adaptation to the reduced efficiency of left hemisphere processing (Richlan, et al., 2009). Furthermore, SLD is also known to be more common in males than females (APA, 2013), and other risk factors for SLD include inherited causes, neurobiological or brain injury, and causes stemming from co-morbid disorders (Javaid, et al., 2020).

Comorbidity

Children with Specific Learning Disorder usually also have Attention Deficit-Hyperactivity Disorder (Cutting & Denckla, 2003; Karande et al., 2007) along with other neurodevelopmental disorders such as Autism Spectrum Disorder, Developmental Coordination Disorder, and Communication Disorder (APA, 2013). Attention deficit hyperactivity disorder (ADHD) while not considered a learning disorder, can certainly disrupt learning. Children with ADHD often have problems sitting still, staying focused, following instructions, staying organized, and completing homework (Kemp, et al., 2017). Cutting and Denckla (2003) reported that the overlap between SLD and ADHD is executive dysfunction, that is, deficits in executive functions (cognitive processes that control other cognitive processes). Similarly, Sharifi and Asanjarani's (2023) study revealed that ADHD and SLD are associated with impaired executive function and increased behavioral-emotional problems. Cantwell and Baker (1991) found a strong positive relationship between SLD and ADHD in both initial and follow-up samples of a study of 600 speech/language-impaired children.

These children also had increased rates of mood disorders and anxiety disorders. In a similar study by Toro et al. (2018), a higher proportion of children with reading disorders were found to have internalizing or externalizing disorders including mood disorders. The mood disorders reported by these studies among these children may largely be due to the difficulties they face psychologically, academically, and socially.

Case Introduction

The client, referred to as Obi, is a 12-year-old boy from South-East Nigeria who as at the time of this assessment was still in primary one (first grade). He was referred by the school principal who knew there was an academic challenge but could not precisely define it.

Presenting Complaints

Obi had academic difficulties so challenging that at 12 years of age, he is still in primary one. He was unable to read, write, spell, or solve Mathematics, all of which were reflective of a very low academic performance. Obi's teacher reported that he did not hesitate to copy his notes and do his class work, in fact, he was usually the first to complete such tasks in his class. However, his writings were unreadable by anyone including him. She reported that though she did not exactly understand his difficulty, she was very patient with him, encouraging him to continue writing so that he would not be discouraged about coming to school. Most of his classmates, however, did not understand the difficulties he faced and found it strange that he did not read or write at his age. Of course, he was one of the oldest in his class, with his immediate younger brother being two classes ahead of him.

History

Obi is the first child of seven children, including four other boys and two girls. He is, however, the only child with experiencing psychological difficulty. His parents indicated that no known living or dead relative has had such a challenge. The father is a driver, while the mother is a housewife. They both were educated to secondary school level.

Obi's parents insisted that they sparingly take alcohol and do not smoke. His mother however admitted that she took some local herbal mixture during Obi's pregnancy which was purported to make the foetus have less weight. She does not know the content of the mixture and did not take it when she was pregnant with her other children.

Obi's mother stated that his birth was normal and there were no birth complications. She indicated that when he was a few months old, she observed that a part of his head was slightly swollen, but this reduced with time. She also reported that Obi had an epileptic seizure once and that she and her husband's mother sought the help of an herbal doctor to address the issue.

His developmental milestones were not achieved age-appropriately, that is, he did not walk or talk as early as other children. They associated these delays with the frequency with which adult friends of the family repeatedly carried him around. Both parents indicated that his preschool years were preceded by delays in attention, language and motor skills, and that he was not performing well in school. Obi's mother reported that at home, he is easily distracted from completing his tasks. He could be told to wash plates and while at it, something else distracts him leaving the task undone until his attention is called to it again. Obi's mother reported that these delays and poor performance both in school and at home were a source of constant concern for her and prompted her to conclude that something was wrong with her child. Hence, she sought help in prayer houses. She also reported that Obi prefers to draw (his room is filled with drawings on the walls) and play alone most of the time. His eating and sleeping habits are both reported to be normal by his parents.

Assessment

Obi was assessed both by in-session behavioural observation and classroom observation. History gathering interviews were conducted extensively which included his father, his mother and his two teachers. Spelling and writing tests were also administered, and additional information was provided with the Wechsler Intelligence Scale for Children (WISC-IV) and SNAP-IV Teacher and Parent Rating Scale.

On observation, Obi was a young boy, neatly dressed and well-groomed. He was however shy and avoided eye contacts as much as possible both in class, and during the first sessions of therapy. He speaks English and Igbo fluently and is quick to express himself, when necessary, though he prefers to keep to himself. It was noticed that Obi likes drawing, and does that at any available time or place, both on papers and on walls. He writes in class, but his writings are difficult to read. He makes errors that reflect mirror images such as using d for b, and b for d; misses out vowels or consonants in words such as chldn for children, "evryting" for everything; and could write numbers in reverse such as 71 for 17. Obi is also impatient in finishing his tasks and can be distracted by almost anything while working. Spelling and writing tests were also administered in which he performed poorly. He could not correctly spell simple words such as No and Yes. Generally, his writings are illegible.

Obi's performance in the subtests of Wechsler Intelligence Scale for Children (WISC-IV) was very poor, scoring zero in some of the subtests including Block Design and Letter-Number Sequencing. Scaled scores on Perceptual Reasoning (PR=7), Working Memory (WM=2) and Processing Speed (PS=2) were all below norms. SNAP-IV Teacher and Parent Rating Scale was administered to the teacher and parents to ascertain the availability of ADHD symptoms. Scores were Attention Deficit/Hyperactivity Disorder inattention (C-In)=

1.11; Attention Deficit/Hyperactivity Disorder hyperactivity/Impulsivity (ADHD-H/Im) = 1.11; Oppositional Deviant Disorder (ODD) = 0.63; Inattention domain (ID) = 2; Aggression/Deviance (A/D) = 1.4; Conners Index (CI) = 1.5. These scores indicate the client's elevation on the inattention sphere and further confirm in-session and classroom observations of the client's behavioural dispositions.

Case Conceptualization

The observations, interviews, and assessments show that Obi has Specific Learning Disorder (SLD) with specifiers for impairment in reading, written expression, and Mathematics, comorbid with ADHD. His inability to read, write legibly, spell, or solve Mathematics are characteristic features of SLD. The differences in the DSM-5-TR diagnostic criteria for ADHD and SLD, the assessment of core symptoms and their sources using the Wechsler Intelligence Scale for Children (WISC), and Parent and teacher report reveal that Obi's inability to read, write, spell or solve math problems stems from core deficits in phonological processing, working memory, or numeracy skills that may be amplified by inattention or impulsivity but not directly cause the specific deficits in reading, writing, or math characteristic of SLD. Reversals in writings such that the words are mirror images are also frequently observed in SLD as well as missing out vowels and consonants in words (Harrison, 2022; Minnesota Neuropsychology, 2022). ADHD (primarily, inattentive type) is evident in the test result, in impatience to complete tasks both at home and in school, and in frequent distractions.

His parents indicated that his preschool years were preceded by delays in attention, language and motor skills. These were indicated in DSM 5 to precede SLD. The head swellings described by the mother is a feature of dyslexia according to Armstrong (2010), stating that high secretion of testosterone during prenatal development causes the slowing down of the left hemisphere, and in compensation, the right hemisphere gets larger.

Though the mother avoided substance use to the best of her knowledge, the content of the herbal mixture she took is unknown to her, and may be implicated in the prenatal development, subsequently, a risk factor in SLD. As Siegel (2006) reported, prenatal exposure to nicotine and low birth weight (which she was trying to achieve by taking the herbal mixture) are risk factors in SDL.

Course of Treatment and Assessment of Progress

Obi could not receive early diagnoses because of the family's low socioeconomic status. They could not afford hospital visits for mental health checks. The parents also believed that Obi's difficulties were spiritual, and this made the treatment course challenging since psychological help was neither considered nor desired. However, a multimodal approach which considered his age, family socioeconomic status, religious beliefs of the family, the general cultural beliefs, and readiness for change were factored in

the therapy alongside standard cognitive-behavioral procedures.

Basics in English Language and Mathematics were first reintroduced to him. English Language involves reading and writing of alphabets A-Z. At first, it was an uphill task since he was frequently distracted by almost everything around him, including the wristwatch the therapist was wearing (which was quickly removed). Mathematics involves counting numbers and writing them. He could write properly only up to number 10. Other numbers were written well at first, but written in reverse at other times.

Obi's parents and teachers were psychoeducated on how to help Obi perform better in class and at home. These sessions lasted for a period of three weeks, occurring thrice weekly and included among other things, guided discovery strategies as proposed by De Boo and Prins (2007) and Swanson (2014), and social support provision as indicated by Matteucci, et al. (2019). His teachers were advised to read aloud notes written on the board, and to encourage him to speak often since he cannot read but understands verbal instructions. Also, assessments could be modified for him, with more oral assessments than written ones. While Siegel (2006) recommended that educational interventions such as the use of computers, tape recorders, speech synthesizers, and speech recognition devices could be very helpful in both reading and writing for children with SLD, it was difficult in Obi's case since both his parents and his school could not afford them. During the psychoeducation sessions, his parents and teachers were further educated on how guiding him in exploring his talents in drawing could enhance his mastery of the art and facilitate future production, promotion and sale of his works which could afford him a living. Armstrong (2010) reported that individuals with dyslexia usually have visual-spatial and entrepreneurial abilities and several individuals in art schools have SLD. Individuals with SLD can do well as graphic artists, photographers, entrepreneurs, sculptors, fine artists, product designers, interior decorators, and so on (Armstrong, 2010).

Although Obi has a lot of support from his family and teachers, he needs more support especially now that his parents and teachers were no longer ignorant of the psychological disorder. This was thus emphasized to them during the psychoeducation sessions, clearly explaining that in cases such as this, academic struggles usually challenge self-confidence and could eventually lead to depression (Ramsay & Rostain, 2005). Matteucci, et al. (2019) found that compared with the general population, children with SLD and ADHD comorbid reported significantly lower level of psychosocial health. Children with SLD therefore need a lot of social support from people around them. They need to know that they are accepted and are an integral part of the family and society. This could help boost their self-esteem and improve their well-being.

Complicating Factors

Substance use

Alcohol consumption, smoking, non-prescription drugs, and foods/drinks with active ingredients are dangerous for pregnant mothers. Therefore, mothers should avoid alcohol consumption, smoking and even the use of non-prescription drugs during pregnancy. Furthermore, active ingredients of foods and drinks should be ensured to be harmless before use by pregnant mothers. To ensure these precautions are adhered to, antenatal care is particularly important and should be strictly observed by pregnant mothers to ensure the creation of healthy babies. Additionally, since studies (Azuine et al., 2019; Corsi et al., 2020; Gustavson et al., 2017; He et al., 2020; National Institute on Drug Abuse, 2021) have shown that prenatal exposure to substances such as alcohol, tobacco, and non-prescription drugs has been associated with an increased risk of neurodevelopmental disorders, including Specific Learning Disorders (SLD) and Attention-Deficit/Hyperactivity Disorder (ADHD), it is likely that Obi's mother's use of a substance during pregnancy could have contributed to the development of Obi's SLD, ADHD, or both.

Inability to access adequate care

It was difficult for Obi's family to get adequate care from mental health personnel, whether psychologists or psychiatrists. This was because of the parents' socioeconomic status, coming from a low-income background. Also, it was not regarded as a pertinent need by the parents even when the details of the psychopathology and treatment were explained to them. The basic therapy Obi already received was free since it was a community service offered to the local school around the university within a short period of three months. Obi's case, however, require a more comprehensive therapy which he could not access. This is a common problem since health insurance in Nigeria is not widespread. Less than 5% of the population have access to health insurance, and most of them are workers in the formal sector (Awosusi, et al. 2015).

Follow-Up

Obi was reported by the teachers to have improved in class. His writings were still not readable, but he raises his hand to attempt questions in class, a behaviour he hardly ever displayed earlier. Class notes which involved diagrams and drawings were easier to understand than notes comprising words and numbers. He also plays with other children in school and can quickly express himself if need be. Long-term follow-up could not be continued since therapy was a short one. However, clinical psychology interns from the Department of Psychology, University of Nigeria, Nsukka, who began internship at Obi's school shortly before the authors'

completed their internship there, were debriefed on Obi's case and the extent of intervention with him, his parents, and teachers. Documentation regarding the entire process was also made available to the interns after seeking consent and approval from Obi's parents. These were done to enable continuity with Obi's intervention.

Treatment Implications of the Case

Coping in an environment where many people have limited awareness of Specific Learning Disorder (SLD) is very difficult. Because Obi's case was strange both to the parents and teachers, it took quite some time and a lot of psychoeducation to explain Obi's problems. The movie character 'Ishan' in the movie 'Like Stars on Earth' may help a layman to understand SLD and the difficulties faced by individuals with such disorder bearing in mind, however, that individual differences should also be accounted for. As Palombo states, 'children with learning disorders appear to suffer psychologically more than their peers who do not have learning disorders. Their psychological suffering cannot be measured through manifest symptoms alone, as many do not display such symptoms' (Palombo, 2001, p.3). Obi does not only face the problem of poor academic performance because of his difficulties in reading, writing, and Mathematics, he also faces the problem of being accepted by people around him and accepting himself. This, of course, has affected his relationship with others. This explains why he keeps to himself and prefers playing alone.

Obi walks across another class especially that of his seniors throwing his face away from people until he gets to his destination. When asked why he does that, his response was that he was shy. He cannot stand other pupils looking at him and would often fiddle with his pencil while he looks away to distract himself. As earlier mentioned, his younger brothers are already ahead of him in class and one of them performs exceptionally well academically. One can imagine how less competent and demoralized Obi feels. It thus describes a poor relationship with others in which the individual feels insecure and sometimes alone or distant from others; and low self-acceptance where the individual is often described as self-critical, confused about their identity, and wish to be different in many respects (Henriques, 2011).

Limitations

While the study provides valuable insights into the associations between Specific Learning Disorder (SLD) and attention deficit hyperactivity disorder (ADHD) in a Nigerian context, there are potential limitations to consider: The study provided an in-depth analysis of a specific case but may not allow for generalizability due to the sample size and because it is not representative of the diversity within the broader population of school children with SLD and ADHD in Nigeria due to the focus on a single case report. The unique circumstances of the

individual (*Obi*) may not be applicable to all children with SLD and ADHD. Also, a case study design limits the ability to establish causal relationships between SLD, ADHD, and the observed difficulties. The study's reliance on observations, interviews, and psychological tests, may introduce subjectivity and bias. Being a case report, the study offered a specific case perspective on the current state of the child (*Obi*) rather than a longitudinal perspective which could have provided additional insights into how these difficulties evolve.

Recommendations

Recommendations for parents with children with SLD and ADHD

For parents who are uneducated or unfamiliar with learning problems of childhood and adolescents like Obi's, the frustrations associated with grappling with SLD and ADHD co morbidity and their impact on their children can be enormous. Professionals working with children with SLD and ADHD comorbidity can reduce these frustrations by offering support and psychoeducation to families of children with SLD and ADHD to help them better understand the nature, course, perpetuating factors, and complexity of these learning disorders their children experience, and manage the challenges faced by their children. This support and education could involve the provision of resources to enhance parenting skills and strengthen support networks, and workshops and counseling opportunities that would serve as psychoeducational platforms which would greatly enhance parents understanding of their children's struggles, improve their involvement in their children's lives, and assist them in providing their children with supportive environments that would foster their development. Parents should also support their children with SLD and ADHD by employing the services of professional school/educational, developmental, and clinical psychologists to engage such children in intensive remedial education and behaviour change. Given that school/educational, developmental, and clinical psychologists specialize in and have specific knowledge of the assessment and learning of children, they would enrich the lives of such children with SLD and ADHD by aiding them in building rich vocabulary, pronouncing properly, spelling and reading accurately, understanding meanings of words in context, writing legibly, calculating accurately and being attentive. Also, parents should endeavour to avoid comparisons between their children with SLD and ADHD comorbid and those without.

Recommendations for schools with children with SLD and ADHD

Being that teachers and learning professionals are largely responsible for and spend much time with pupils in school, there is great need for them to be provided with training and to be engaged in frequent, impactful, and specifically targeted awareness programs which will enhance their abilities to identify and support students with SLD and ADHD. This includes recognizing the associated difficulties and implementing appropriate strategies within the

classroom setting. Teachers should also avoid comparisons between their pupils with SLD and ADHD comorbid and those without.

Recommendations for mental health providers managing children with SLD and ADHD

Following Obi's case, had the authors not embarked on a community service, they would most probably not have identified, commenced more focused observation, and subsequently attended to Obi's condition. Identifying in-school children population with SLD and its comorbid is germane to assisting them and their families. School/educational, developmental, and clinical psychologists are encouraged to engage in more community service especially in schools, with a view to addressing learning and mental health issues that exist therein. Once the frequency of community service is increased, children identified as having SLD should be routinely screened for comorbid psychopathology so that early intervention can be initiated for them. Toro et al. (2018) also assents to this suggestion noting that mood disorders may be a prevalent comorbid psychopathology with such cases.

School/educational, developmental, and clinical psychologists should adopt a more comprehensive and multimodal approach to assessment which should include observational and interview methods as well as neuropsychological assessments and additional standardized testing with a view to providing a more comprehensive understanding of children's cognitive functioning. Further multidisciplinary collaboration should be encouraged among professionals (psychologists, educators, social workers, and healthcare providers) to ensure a holistic and integrated approach to addressing the needs of children with SLD and ADHD.

Furthermore, targeted intervention strategies to address the specific learning difficulties in reading, written expression, and mathematics identified in the case of *Obi*, should be developed and implemented by professionals working with children with SLD and ADHD comorbid, and should be tailored to the unique needs of children with comorbid SLD and ADHD, considering their impact on academic, social, emotional, and psychological well-being.

Given the peculiarity of SLD in association with ADHD, longitudinal monitoring which is fundamental in tracking the progress of children with SLD and ADHD over time, should be considered, encouraged, and adopted to provide valuable insights into the effectiveness of interventions and the persistence or alleviation of symptoms.

Also, if community service is short, proper referrals regarding children with SLD and ADHD comorbid should be made, noting the extent of treatment, client outcomes, and possible future expectations. These referrals are important in guiding the follow-up process especially when community

service is rotated among mental health workers.

Alongside working towards improving learning and changing the behaviour of children with SLD and ADHD comorbid, school/educational psychologists should as well focus on teaching children self-esteem and self-acceptance skills to restore their confidence and belief in themselves and in their uniqueness. Issues of cultural sensitivity as it relates to learning difficulties should be recognized. This would promote culturally sensitive approaches to assessment and intervention, considering the unique cultural context of each child. It would also address potential stigma and victimization arising from poor understanding of SLD and ADHD comorbid.

Professionals working with children with SLD and ADHD comorbid should advocate for policies that support the inclusion and accommodation of students with learning difficulties in the educational system. This may involve promoting policies that provide resources, training, and specialized support for teachers. Additionally, call for increased funding for research in the field of learning disorders and mental health in the context of Nigerian schools should be greatly encouraged and undertaken given the prevalence of learning disorders and its comorbidities in Nigerian schools. This could support further studies, interventions, and the development of culturally relevant assessment tools. In embarking on research to increase understanding of learning disorders in school settings, the importance of maintaining ethical standards in research involving children must be emphasized and adhered to. Informed consent, confidentiality, and protection of the child's well-being throughout the research process should be ensured.

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Figures

RIS for **SIR**

Figure 1: Example of mirror image in Obi's writings