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MIGRATIONS TRANSFRONTALIÈRES ET DÉFIS SÉCURITAIRES EN AFRIQUE

Université d'Abomey-Calavi (Bénin) du 12 au 14 janvier 2023

LES ACTES
DU COLLOQUE

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Axe 6:

VARIA

NEUROPLASTICITY AND AGE-RELATED DIFFERENCES IN FOREIGN LANGUAGE LEARNING

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Abstract

This study focuses on the role of neuroplasticity in EFL teaching/learning, with an emphasis on age-related differences in the brain's ability to acquire new language features and its implications for effective teaching and learning with adult learners. The study aims to find how understanding the brain's structure and functioning could help facilitate the English language learning for adult learners. This study used a mixed-methods. The investigation consisted in collecting information through questionnaires and interviews from a sample of 40 EFL young and adult learners aged from 21 to 57 studying English at "*Languages access"* for a 3-month oral communication skills development programme. The results analysed with Excel 2021 and SPSS version 27 and presented in frequency and percentages through figures and tables reveal that neuroplasticity highly influences adult learners' ability to learn and master a foreign language. This study suggests creating tasks that can trigger brain plasticity to facilitate the learning process for adult learners.
Keywords: Neuroplasticity, Age-Related Differences, EFL

Résumé

NEUROPLASTICITÉ ET DIFFÉRENCES LIÉES À L'ÂGE DANS L'APPRENTISSAGE DES LANGUES ÉTRANGÈRES

Cette étude se concentre sur le rôle de la neuroplasticité dans l'enseignement/apprentissage de l'Anglais comme langue étrangère. Elle met l'accent sur les différences liées à l'âge dans la capacité du cerveau à acquérir de nouvelles caractéristiques du langage et ses implications pour un enseignement et un apprentissage efficaces avec des apprenants adultes. L'étude vise à faire découvrir comment la compréhension de la structure et du fonctionnement du cerveau pourraient aider à faciliter l'apprentissage de l'anglais par les apprenants adultes. Cette étude a utilisé une méthode mixte. L'enquête a consisté à collecter des informations par le biais de questionnaires et d'entretiens auprès d'un échantillon de 40 jeunes apprenants l'Anglais comme langue étrangère et adultes âgés de 21 à 57 ans étudiant l'anglais à "Languages access" pour un programme de développement des compétences en communication orale de 3 mois. Les résultats analysés avec Excel 2021 et SPSS version 27 et présentés en fréquence et en pourcentage à travers des figures et des tableaux révèlent que la neuroplasticité influence fortement la capacité des apprenants adultes à apprendre et à maîtriser une langue étrangère. Cette étude suggère de créer des tâches qui peuvent déclencher la plasticité cérébrale pour faciliter le processus d'apprentissage des apprenants adultes.
Mots-clés : Neuroplasticité, Différences liées à l'âge, anglais, langue étrangère.

1. Introduction

Language learning is a complex and dynamic process that relies on a wide range of cognitive and neural mechanisms. At its core, language learning involves the acquisition of a complex system of rules and structures that govern communication, including grammar, syntax, and vocabulary. As neuroscientist

and language expert Petitto (2000) explains, "Language is the fundamental medium of human communication, and the brain is its tool." In recent years, there has been a growing interest in the role of neuroplasticity in language learning, which refers to the brain's ability to adapt and reorganize in response to experience. According to Pierce and Madan (2017), the brain's remarkable capacity to adapt and change in response to new experiences also known as neuroplasticity provides the potential for lifelong learning. This concept has important implications for language learning, as it suggests that individuals may be able to improve their language abilities through targeted training and practice.

However, the role of neuroplasticity in language learning is not uniform across the lifespan. In particular, there is growing evidence that the brain's ability to learn a new language declines with age, with children generally thought to have a greater capacity for language acquisition than adults. According to a study by BrainFacts.org (2020), "Children's brains are uniquely equipped to acquire language because they are still in the process of developing cognitive abilities." This raises important questions about the neural mechanisms underlying language learning and how these may be affected by age.

The purpose of this paper is to assess the age-related differences in the performance of EFL learners attributed to neuroplasticity in the foreign language learning process, to minimise ageing inhibitions. Anchoring this research purpose, three specific questions have been addressed:

- What are the challenges faced by adult EFL learners in foreign language learning?
- How does ageing affect the specific neural mechanisms involved in language learning?
- How can language learning be optimized to facilitate English language learning for both young and adult learners?

This research paper introduces the concept of neuroplasticity and discusses how its understanding could be applied in the field of andragogy to make English teaching more effective for adult learners.

This paper has been structured into six sections. Back to the introductory part, the literature review is provided, it deals with the report of some researchers who have got to deal with the topic. The third section is about the target population and the sampling, the research instruments, the data collection procedures and the methods of data analysis. The fourth section hinges on the presentation and interpretation of the results, the fifth one is devoted to the discussions and suggestions and the last section is concerned with the conclusion.

2. Theoretical Keystones

The theoretical keystones for this study draw on the concepts of neuroplasticity in education, foreign language learning, and age-related differences in neuroplasticity.

2.1 Neuroscience and Education

The use of neuroscience in education has gained significant attention as it provides insights into how the brain learns and retains information. According to Jensen (2010), a leading expert in the field of education and neuroscience, the goal of bringing these two fields together is to help educators understand how the brain learns and how to use that knowledge to improve teaching and learning. By integrating neuroscience findings, educators can create a more effective and personalized learning environment that fits the individual needs of each student. For instance, Ratey and Hagerman (2008) backed up by Sousa (2017) acknowledged that understanding the importance of sleep and exercise in promoting cognitive function and using active learning strategies that engage multiple senses have been shown to improve students' outcomes. Therefore, the integration of neuroscience in education provides evidence-based strategies that have the potential to revolutionize teaching and learning, leading to improved learners' success.

2.2 Neuroplasticity and Foreign Language Learning

Neuroplasticity or brain plasticity is the brain's ability to reorganize and adapt in response to new experiences. It plays a fundamental role in foreign language acquisition, allowing the brain to adapt and change in response to new information. Doidge (2007) explains that the brain is capable of changing itself in response to external stimuli. This capacity for change allows the formation of new neural connections and pathways that are essential for language learning. Research by Schlegel et al. (2012)

revealed that just six weeks of language training could significantly alter participants' brain connectivity patterns, allowing them to better emulate those of native speakers. Additionally, studies by Li et al. (2014) demonstrated that second language training-induced changes in the white matter structure of the brain. By understanding the importance of neuroplasticity, educators and learners can develop strategies that support effective language acquisition. These might include activities like consistent practice and exposure to native speakers. Such activities foster an environment that promotes neuroplasticity, which can lead to enhanced language acquisition abilities.

2.3. Neural Mechanisms underlying Adult Language Learning

Rodriguez-Fornells et al. (2009) and Wong et al. (2012) have found that language learning engages a network of brain regions involved in different cognitive processes, including attention, working memory, and semantic processing. Schlegel et al. (2016) advocate that individual differences in language learning ability are associated with differences in brain structure and function. For example, adults with better language learning abilities tend to have greater grey matter volume in areas of the brain related to language processing and executive function. Furthermore, Makuuchi et al. (2013) and Wong et al. (2015) studies have shown that the neural mechanisms underlying language learning can be influenced by a variety of factors, including motivation, age, and prior language experience. Understanding the neural mechanisms of language learning in adults can inform the development of effective language teaching methods and interventions that target the specific cognitive processes and brain regions involved in language learning.

2.4 Age-related Differences in Neuroplasticity

Neuroplasticity is the brain's ability to adapt and change over time, but it can be influenced by age. As Dr Michael Merzenich, a leading expert in neuroplasticity, explains, "The older we get, the harder it is for the brain to change in response to new experiences." This is because, according to Merzenich, "As we age, the brain becomes less plastic and more fixed in its ways." However, neuroscientist Dr Sarah-Jayne Blakemore points out that while there may be some decline in neuroplasticity with age, "it's not all bad news." She notes that "older brains can be just as adaptive as younger brains in some ways, particularly when it comes to more complex cognitive processes." Overall, while age-related differences in neuroplasticity may exist, there is still much to learn about the brain's ability to change and adapt throughout a lifetime.

2.5 Evidence-Based Activities and Interventions to Boost Brain Plasticity in Adulthood

According to renowned neuroscientist Merzenich (2013:6), "the adult brain retains far more capacity for change than was ever thought possible, and that can be put to use for the better". Similarly, author and neurologist Sacks (2007:23) noted that "the brain, after all, has the capacity for change – for its very structure to be altered by experience". Furthermore, writer and psychologist Daniel Goleman (2013:10) has observed that "the best news about our brain is that we can change it – even into old age". These statements underscore the fact that the adult brain is not fixed, but rather, is capable of adapting and changing in response to experiences and environmental stimuli. Engaging in certain activities can help promote brain plasticity in adults. For instance, Draganski et al. (2006) acknowledged that learning a new skill, such as a language or a musical instrument, can create new neural pathways and improve cognitive function. Cotman and Berchtold (2002) recognize that “physical exercise has also been shown to have a positive impact on brain plasticity by increasing the production of growth factors that promote the growth and survival of new neurons”. In addition, Greenwood and Paraskevoudis (2018) remind us those social activities, such as participating in group discussions or volunteering, have been found to stimulate brain plasticity by promoting cognitive flexibility and increasing social connectivity. By engaging in these types of activities, adults can promote brain plasticity and improve their cognitive functioning over time. In a language learning class, several activities can help promote brain plasticity in adults. For example, practising a new language every day can create new neural pathways and improve cognitive function (Draganski et al., 2006). Engaging in conversation with a language partner can also stimulate brain plasticity by challenging adults to use new words and phrases in context (Pliatsikas et al., 2015). In addition, reading or listening to content in the target language can help

improve language comprehension and stimulate the brain (Skehan, 2014). By engaging in these types of activities, adults can promote brain plasticity and improve their language learning ability over time.

3. METHODOLOGY

3.1 Research Design

This research used a quasi-experimental mixed method design to determine the extent to which the difference in EFL learners' overall oral communication skills development between adult and young learners can be attributed to age-related neuroplasticity. The experiment involved a pre-test and a post-test to measure the oral performance of both adult and young learners' group respectively at the beginning and the end of a 3-month intensive English learning programme provided by languages access language centre for communicative skills development. The pre-test was run to ascertain that there is no statistically significant difference in oral performance between groups before the experiment.

It is important to point out that all the selected participants had already learned English at secondary schools but for some reasons could not communicate in English. They joined the programme to develop oral communication for professional purposes.

3.2 Sample Description

The population was made of forty professionals joining '*English for All*' an intensive communicative English programme organised by the '*Languages accessed'* language centre in Porto-Novo the capital of Benin for professionals willing to boost their communicative skills. The programme gathered 62 participants from whom 40 were selected and split into two groups of 20 young and 20 adult EFL aged respectively from 21 to 35 and 45 to 57 with at least 10 years gap existing between groups' ages. This 10 years gap is essential to assess any perceptible, yet significant difference in learning performance that could be attributed to age-related neuroplasticity activities.

3.3 Instruments

Four instruments were used for this research namely:

- Questionnaires to EFL learners
- Interviews with EFL learners
- Oxford Placement Test (OPT)
- Self-Reported English Fluency

Each instrument is worth describing to have a clear understanding.

3.3.1 Questionnaires to EFL Learners

Ten (10) questions have been addressed to the participants to access their current challenges in the learning process, and their previous experience with English at secondary schools.

3.3.2 Oxford Placement Test (OPT)

The Oxford Placement Test (OPT) is a standardized, on-demand English language computer-adaptive test designed to test English non-native speakers' overall language ability. Made up of sixty (60) questions related to knowledge of different signs and notices used to indicate particular meaning, cloze passages, English grammar and vocabulary.

3.3.3 Self-Reported English Fluency

Self-Reported English Fluency is a test where participants completed a self-report measure of their English fluency, which included items assessing their comfort in speaking, listening, reading, and writing in English, as well as their confidence in their overall English language ability. Responses were scored on a 7-point Likert scale.

3.3.4 The interviews

Semi-structured interviews were used to collect comprehensive data related to the participants' poor performance in EFL teaching-learning at secondary schools, their motivation for joining the current *English for all* progamme and their awareness of any substantial performance variation of their learning abilities over time.

3.4 Procedures of Data Collection and Methods of Data Analysis

The study started with the consent of both participants and '*Languages Access*' authorities. Data were collected from EFL learners. The questionnaire is both made in French and English version. Forty (40) learners have been addressed questionnaires aged from 21 to 57. During the OPT, the researcher's Wi-Fi has been used to ensure the smoothness of the test procedure. Data obtained from the target population were analysed with SPSS version 27 and excel 2021 and exposed through tables, figures, and percentage mode method with comments under them for explanation purposes.

4. RESULTS

4.1 Difficulties encountered by EFL Learners

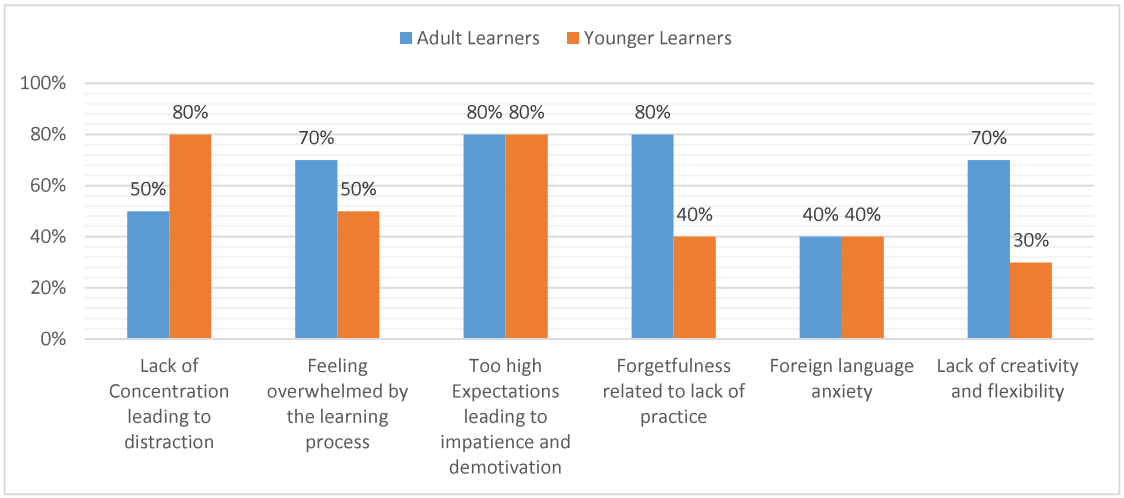

Figure 1: Difficulties encountered EFL learners

Figure 1 shows that the participants share the same difficulties related to the level of anxiety (40%) and the demotivation resulting from too high expectations and impatience with achievement (80%). Other challenges are differently experienced by the respondents. The lack of concentration is predominant among younger learners (80% against 50%) while most adults, subject to forgetfulness (80% against 40%) and the lack of creativity and flexibility (70% against 30%) feel overwhelmed by the learning process.

4.2 Previous experience with EFL teaching Learning

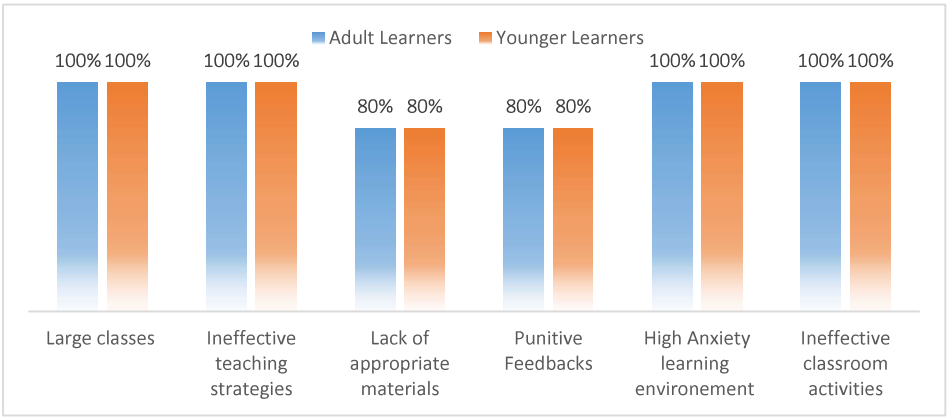

Figure 2: Previous experience with EFL Teaching-learning

Figure 2 proves that unanimously both groups share the same difficulties related to the conditions that could explain their inability to communicate in English after 7 years in secondary school. The main hindrances of the Beninese educational system are the large classes, the ineffective teaching and classroom activities strategies and the high anxiety environment. Besides, 80% of the respondents identified the lack of appropriate materials and the quality of teachers' feedback to be highly inhibiting factors embedded in the Beninese EFL teaching-learning-evaluation process.

4.2 Correlations between Age and Language Learning Outcomes

Table 1: Correlations between Age and Language Learning Outcomes

Measure of Language Learning Outcome	Correlation with Age
English Proficiency Test Score (OPT)	-.58**
Self-Reported English Fluency	-.45*
Use of English in Daily Life	-.39

Note: ** $p < .01$; * $p < .05$

Table 1 shows correlations between age and language learning outcomes. The strongest negative correlation is between age and English proficiency test scores (OPT) with a correlation coefficient of **-.58 ($p < .01$)**, it indicates that older learners may have more difficulty to achieve a high level of proficiency in English compared to younger ones.

4.3 Regression Analysis of Age and Effort on English Proficiency Test Scores

Table 2: Regression Analysis of Age and Effort on English Proficiency Test Scores

Predictor Variable	Standardized Coefficient	t-value	p-value
Age	-.51	-4.73**	.001
Effort	.36	3.25*	.02
Constant	72.45	9.21**	.001

Note: ** $p < .01$; * $p < .05$

The results in table 2 present a regression analysis of age and effort on English proficiency test scores. The results show that ageing harms performance, with a **standardized coefficient of -.51**, indicating that older adults tend to score lower on the test. The results also show a positive effect of effort on test scores, with a **standardized coefficient of .36**.

4.4 Learners' Self-Reported Used Language Learning Strategies

Table 3: Self-Reported Use of Language Learning Strategies

Language Learning Strategy	Percentage of Participants Reporting Use
Memorization	90%

Language Learning Strategy	Percentage of Participants Reporting Use
Practice	70%
Social Interaction	50%
Media Exposure	40%
Formal Instruction	20%

According to table 3, the most commonly reported language learning strategy is memorization, with 90% of participants reporting its use followed by practice which is the second most common strategy, with 70% of participants reporting its use. Social interaction is reported by 50% of participants, while media exposure and formal instruction are reported by 40% and 20% of participants, respectively.

4.5 Interviews Report

The interviewees reveal that the main reason for joining the *English progamme* at '*Languages Acces*s' has to do with effective oral communication skills development for professional needs. Communication in English should boost their career by empowering them to join professional networks and attend online professional development workshops and training. They confess that they performed better in other subjects of the curriculum and give up on English because the EFL classes were boring and they attended courses just to get the average to pass. Clearly, the importance of learning and engaging in mentally stimulating activities for the effective and sustainable development of communicative skills was not emphasised in English classes.

Addressing the perception of learning abilities and challenges over time, unanimously, the respondents acknowledged that it was easier for them to learn when they were younger mainly because "life was less stressing and competitive" there were more enjoyment and more time, time to make mistakes and start over to improve. Patently, adulthood responsibilities and the stress they generate are highly inhibiting to learning.

5. DISCUSSION

The experiment results in Table 1 show correlations between age and language learning outcomes. The strongest negative correlation is between age and English proficiency test scores (OPT) with a correlation coefficient of **-.58 ($p < .01$)**, which indicates that older learners may have more difficulty achieving a high level of proficiency in English compared to younger ones. Table 2 confirms that ageing affects negatively learners' performance, with a standardized coefficient of -.51, indicating that older adults tend to score lower on the test. This confirms that there is a significant difference in oral performance related to the ageing process that impacts negatively adult EFL learners' performance. As Doidge (2007:3) notes, "the brain is not a static organ, but rather a dynamic, self-organizing system that is capable of reorganizing itself in response to experience". With the present results even if seem to indicate that the brain becomes less adaptable as we age; we can only assume that learning capabilities are noticeably age dependent.

Neuroplasticity is our brain's internal working, growing and surviving process that may not be affected that much. The decrease in learning performance is mainly resultant form the extrinsic factors that inhibit the brain's internal processes and worsen with our modern life experience. One of the main inhibitors of neuroplasticity is the stress the anxiety that it generates. Research shows that neuroplasticity is at it minimal in stressful environments for it triggers the survival process in which the brain optimises our vegetative functions to protect. Likewise, when stress disappears, neuroplasticity works at its best as our brain produces appropriate hormones to maximise the learning process. This is human beings' natural life process and stress cannot be avoided but appropriately managed there are many effective

strategies to be explored. The real problem is the permanent stress experienced in almost every aspect of life that maintains the survival process and permanently affect neuroplasticity over time.

This corroborates the interview and the questionnaire results as respondents confess the negative impact of the high anxiety EFL class environment on their performance. Figure 2 discloses that the hindrances that explain learners' inability to communicate in English after seven (7) or more years in secondary schools are the large classes, the ineffective teaching strategies and classroom activities, the high anxiety environment, the lack of appropriate materials and the quality of teachers' feedback. In such learning environments, the brain adapts ironically through its neuroplastic nature to diminish its own neuroplasticity to protect and survive as the learning process shift from a joyful experience of continuous pain and stress. According to Reinders and Wattana (2014:62), "the brain is capable of change throughout the lifespan, with neuroplasticity offering a promising opportunity for continued learning and development". The real inhibitor is not the age but the living and learning experience. Fortunately, the learning conditions can be changed to optimise the learning process; and several strategies can be employed.

According to Cárdenas-Claros and García-Mayo (2017:11), one key strategy is to provide learners with opportunities for interaction and communication in English in a relaxed conducive, learners-centred learning environment. This should include structured activities such as role-plays, debates, and discussions, as well as informal opportunities for conversation and socializing. Any effective learning process should integrate emotional intelligence and meaning full practices where real-life challenge matches the learning outcomes with the use of authentic materials and in emotionally and intellectually engaging tasks and projects. For Kim and Elder (2018), incorporating real-world tasks and activities into language learning can provide learners with a sense of purpose and motivation, as well as help them to develop the practical skills needed to function in English-speaking contexts.

Finally, effective English language learning for adult learners also requires attention to the learners' individual needs and goals. Nunan (2004:83) notes that "If learners are to become proficient users of English, then it is important that they become aware of their own learning processes and styles, and that they can use this knowledge to make informed choices about their own learning". Providing learners with opportunities to set goals, monitor their progress, and reflect on their learning can help to promote a sense of autonomy and agency, which in turn can lead to more effective language learning outcomes. This requires more of a paradigm shift from a dogmatic to a positive education orientation before any effective revision to the teaching curriculum. This change of perception should not be restricted to the classroom environment. Rather, it should be a new life process because the performance in learning reflects the performance in sociocultural and socioeconomic life.

6. CONCLUSION

This study provides insights into the impact of neuroplasticity and age-related differences on foreign language learning outcomes for adult EFL students in Benin. The findings suggest that promoting a growth mindset and emphasizing the role of low anxiety and meaningful practice in language learning may enhance language learning outcomes for adult learners. This study shows that the decrease in neuroplasticity is rather associated with the natural adaptation of the brain to painful and high-anxiety learning experiences than an age-related factor. This study adds to the growing body of research on the role of neuroplasticity in foreign language acquisition and highlights the importance of considering age differences in language learning outcomes. By promoting a growth mindset and emphasizing positive education trends in language learning where educators can help learners overcome the negative effects of age-related differences in neuroplasticity and improve their language learning outcomes.

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Les crises sociopolitiques, les calamités naturelles et d'autres situations d'insatisfaction mettent des millions de populations sur les routes migratoires. Les régions du monde et surtout les pays industrialisés présentant plus ou moins une stabilité (politique, économique, culturelle, etc.), constituent des pôles d'attraction qui magnétisent des déplacés et réfugiés venant d'Amérique Latine, d'Afrique, du Proche et Moyen-Orient, même d'Europe, etc. en provoquant un pic de réfugiés en Europe dans les années 1990, suivi d'un ralentissement dix ans plus tard. Si certains mouvements de populations sont internes, d'autres s'effectuent au-delà des frontières des pays de conflits et sont consécutifs des dérives des régimes autoritaires ou totalitaires, les mouvements identitaires à fondement socioculturel, idéologique, religieux, les revendications territoriales, du terrorisme, les raisons économiques, d'emploi, etc.

Au fond, les questions migratoires et sécuritaires sont aussi vieilles que le monde. Elles sont non seulement étroitement liées, planétaires, mais également d'une grande complexité à l'échelle politique, sociale, économique, minière, etc. Les dynamiques sociopolitiques internes au continent africain, forgent l'image d'un foyer en constante ébullition, d'une région incapable d'ordre et en proie à une multitude de tensions structurantes. L'occupation constante de l'espace Afrique subsaharien par les tensions politiques, religieuses et autres véhicule l'image d'une zone en effervescence dont les populations sont soumises à des migrations transfrontalières.

Au demeurant, c'est la redéfinition du concept même de sécurité dans le discours scientifique au regard des aléas politiques, sociaux et naturels en Afrique et ses implications dans le jeu des tendances migratoires qui invitent à discussion.

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