This paper examined complements and heads in Ibibio nominal compounds as well as considered the syntactic and semantic bond between constituents of a nominal compound. The paper adopted the Minimalist Program (MP) by Chomsky (1995). It also conceptualises on Kayne (1994) Linear Correspondence Axiom (LCA) which assumes the universal word ordering between a head and its dependent to be Specifier-Head-Complement (S-H-C). The work provides a unified account for the optimal and plausible nominal compounds in the language. Data were elicited from native speakers of Ibibio from a list of compound words. This work postulates that nominal compounds are left-headed driven in the language. In a noun plus noun compound, the first noun which occurs at the left-periphery of the compound functions as the operator and heads the compound while the other noun which occurs to the right assumes a complement function. The work also discovered that in every noun-plus-noun construction there is a relative clause reduction mechanism (delete) in which what converges at the spell-out is the optimal constituent. For instance, the compound úfộk-ítìàt 'block house' is derived from úfộk ákè ítìàt, 'the house that is made of blocks'. For adjective plus noun compounds, the work argues that what is spelled out at both PF and LF interface levels undergoes some leftward movement of the adjective and a subsequent deletion of the relative clause in overt syntax. For instance, òbúbít ébòt, 'black goat' is derived from the constituents 'ébòt ádòghò òbúbít 'a goat that is black', that actually entered the derivation at the computation stage. It is also revealed that the interplay between syntax and semantics is more revealing in certain ordering of lexical items in which meanings can be altered. Even when the head of an exocentric compound does not subcategorise for its syntactic value, it is observed that the semantics of the left (head) noun predicts the overall meaning of the derived nominal compound. The paper therefore, concludes that nominal compounds in Ibibio are left-headed even in spite of overt syntax variation.