



Review

Structural recognition and nomenclature standardization in forensic knot analysis



Robert Charles Chisnall

60 Dauphin Avenue, Kingston, Ontario, Canada K7K 6B1

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ABSTRACT

The analysis of knots during civil and criminal investigations is characterized by two fundamental challenges: the precise recognition of all structural nuances and the application of accurate, universally recognized terms. These challenges are exacerbated by inconsistencies, contradictions and regional terminology, which occur in common practice and in mainstream books as well as within forensic science. Some knots bear multiple or value-laden names, even misnomers, and some terms have manifold applications. This can lead to ambiguity and confusion. Additionally, many topological concepts and terms are applicable to practical knot-tying, despite the differences between real-world and theoretical knots, but the esoterica of topology are inaccessible to anyone unfamiliar with that branch of mathematics. To highlight these challenges some examples of knots encountered in case work are presented. Significantly, an overview of a few previously ignored issues is examined and several new concepts are introduced. An emphasis is placed on identifying structural variations, standardized nomenclature is outlined, and recommended terminology is derived from fields such as forensic science, chemistry, archaeology, topology and the textile industry. Greater precision in knot identifications, characterizations and descriptions can assist investigators in linking specific tying practises to potential suspects, analysing the manner in which knotted evidence was tied, and understanding how knots and ligatures perform in given scenarios.

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Contents

1. Introduction	282
2. Foundations of knotting terminology	284
3. Topological knots	289
4. Chirality	295
5. Capsizement and topological equivalence	297
6. Value-laden terms and biases	298
7. Structural variations	298
8. Conclusions	301
References	301

1. Introduction

Knots and ligatures have figured prominently in many homicides, suicides, autoerotic fatalities and other cases. Knot evidence can be significant in civil proceedings as well. These latter cases involve litigation related to workplace and recreational accidents, injuries and fatalities. [1–3].

The precise identification of knots examined in case evidence is critical to investigations involving ligatures and tied materials. Distinguishing structural variations cannot be a superficial undertaking. Every detail must be noted with care, especially when reconstructions and exhibit comparisons are required. Attendant to this process is the precise labelling of all structures and features, which is essential to unambiguous communication, accurately written reports and effective courtroom presentations. [4–6]

Historically, there have been inconsistencies in knotting terminology throughout mainstream publications, and sometimes in forensic analyses

E-mail address: chisnall@kingston.net.



Fig. 1. Overhand knots and figure eight knots. From left to right: S Overhand Knot, S Figure Eight Knot, Z Figure Eight Knot, and Z Overhand Knot.

[1,7–10]. Subtle internal structures are sometimes ignored or confused. These include the quality of having a mirror image, and the relative positions of working ends and standing parts. The aim here

is to demystify some of these issues, establish a more rigorous nomenclature framework, promote precision, and introduce exacting conceptual tools. These exacting standards can facilitate a

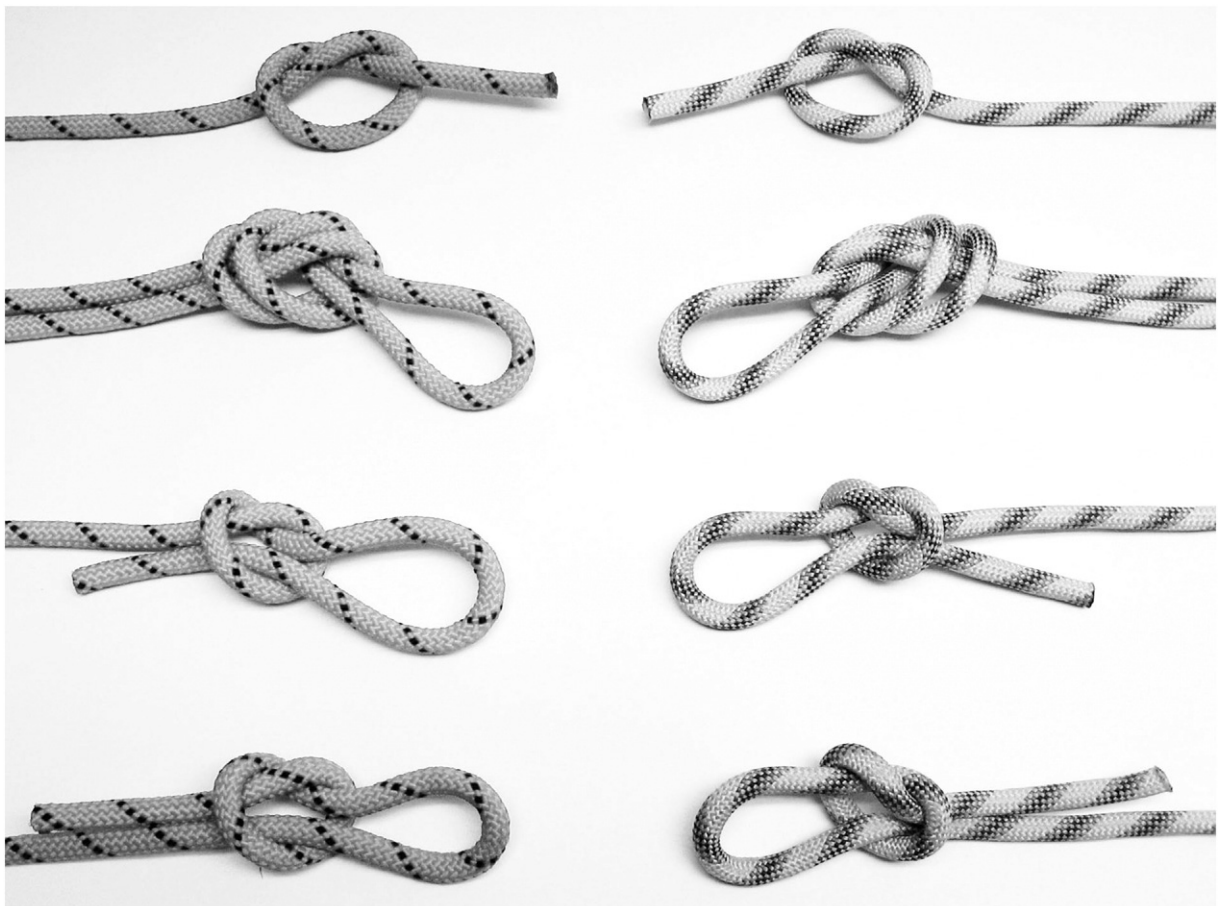


Fig. 2. Overhand Knots, Loops, Slip Knots and Nooses. Left column, top to bottom: S Overhand Knot, Overhand Loop, Overhand Slip Knot, Overhand Noose. Right column, top to bottom: Z Overhand Knot, Overhand Loop, Overhand Slip Knot, Overhand Noose.

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