Physical Sounds as Colimits in the Topos

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The topos is based on the idea of Aristotle for tackling a legal argument with the premises held within its structure and the logic returning true or false as the outcome. In category theory the classical topos as defined by Grothendiek and others is closed at both ends and the truth object or subobject classifier may be more complex, for instance based on the natural numbers. At the lower end there exist products of objects, connected by times X, and a limit. At the upper end there exist coproducts of objects, connected by sum +, and a colimit. If both limits and colimits do not exist, then the category is not a classical topos. Recent work by the authors has concentrated on the example of music in category theory with logical aspects such as players, scores and occasions, the last representing a co-ordinated sound by the performers. This paper will take the work forward by exploring how physical sounds are defined in terms of a topos, the conditions for colimits to exist, the boundaries of their existence in the context of an actual performance and how occasions relate to the `Now' of the philosopher Alfred North Whitehead. The result should advance our understanding of music in universal terms across both the logical and physical levels and feed back into category theory a better understanding of the formation of colimits.