

Framework and Recommendations

Assessing the Suitability of *Paubrasilia echinata* Bow Blanks for Stringed-Instrument Bow Making



Scope, Framework and Recommendations of an
International Empirical Study of Professional Assessment
Practice, Material Assessment,
and Sustainable Resource Use

FINAL

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Preliminary Note

This document sets out the draft of an international empirical study of the professional assessment of *Paubrasilia echinata* bow blanks for modern stringed-instrument bow making.

Its central question is the criteria by which bow makers, violin makers, and dealers (collectively referred to below as specialists) assess individual bow blanks, and how they weigh anatomical, structural, visual, and physical material characteristics in relation to the intended use. The study is concerned not with abstract ideals of the material, but with the actual assessment practices of these professional groups.

The draft rests on the premise that the suitability of a bow blank cannot be inferred from individual measurements, isolated visible characteristics, or statements of volume alone. What is decisive is the specialist's overall assessment of the material. This takes into account, among other factors, the degree and position of particular characteristics, their possible interaction, the intended quality segment, and the planned use of the future bow stick.

The project combines the structured collection of professional experience with methods of empirical social research and, where available, objectively measurable material parameters. It is intended to provide a basis on which professional assessment decisions can be documented transparently, compared, and placed in scientific context.

This document is expressly not presented as a completed study, nor does it anticipate its findings. It proposes research questions, data-collection instruments, approaches to analysis, and possible further lines of inquiry. All instruments, terms, and methodological decisions are to be examined scientifically, tested in a pretest, and refined where necessary before an international survey is undertaken.



Executive Summary

Selecting suitable bow blanks is among the most demanding and consequential decisions in modern stringed-instrument bow making. It affects not only the technical working of the material, but also the later function, durability, playability, and placement of a bow within a particular quality segment.

Although a differentiated professional assessment practice has developed over generations, little research has so far examined the criteria specialists actually use when assessing individual bow blanks. Existing literature deals primarily with botanical, historical, ecological, and materials-science aspects of *Paubrasilia echinata*. An internationally comparative empirical study of professional assessment practice in relation to individual bow blanks is still largely absent.

The planned study is intended to address this gap. It investigates which bow material characteristics specialists regard as essential—characteristics which can be assessed as acceptable or unsuitable, according to their degree, position, or intended quality segment. It distinguishes between prospective assessment of blanks for new bow making and retrospective assessment of finished or existing bows.

At the centre of the study is a shared data-collection instrument with two methodologically coordinated survey routes. Routing A is addressed to bow makers; it concerns the selection, working, and intended use of bow blanks in new making. Routing B is addressed to violin makers and dealers; it additionally considers the technical appraisal of existing bows and questions of market acceptance, restoration, repair, documentation, and legal marketability under conservation law.

Questions concerning the material are supported by standardised image references. These are intended to present typical anatomical, structural, and visual characteristics as consistently as possible so as to facilitate comparable assessments. Relevant characteristics, different degrees of their expression and, where professionally meaningful, different locations along the bow stick are taken into account.

The study also records information on physical properties and selection methods, including density, modulus of elasticity, speed of sound, weight, and other relevant parameters. These data are not to be understood as isolated proof of quality, but in relation to the professional overall assessment of the material.

The investigation follows a mixed-method approach. The standardised international survey permits comparative quantitative analyses. Structured expert interviews will be added where findings require explanation, where there is clear consensus or disagreement to be made visible, or where particular assessment patterns require professional interpretation.

The aim is to document professional experiential knowledge systematically, make commonalities and differences between professional groups visible, and describe the practical assessment of bow blanks in a scientifically transparent way. The findings may provide a stronger basis for research, education, professional practice, material documentation, and differentiated use of existing resources.



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1. Introduction

1.1. Context and Subject of the Study

Since the late eighteenth century, *Paubrasilia echinata* has provided the essential material basis for modern stringed-instrument bow making. Its combination of density, elasticity, strength, workability, and distinctive material behaviour permits the production of bow sticks that meet demanding technical, tonal, and mechanical requirements.

The suitability of an individual bow blank, however, cannot be inferred solely from its species, a single measurement, or an isolated visible characteristic. In professional practice, selection rests on an overall assessment. This encompasses anatomical, structural, visual, and physical properties, together with their degree, position, and possible interaction within the areas of the blank intended for the future bow stick.

A distinction must therefore be drawn between the general suitability of the material and the suitability of a particular blank. While *Paubrasilia echinata* has long been established as a material for modern stringed-instrument bow making, the practical usability of individual blanks can vary considerably. A blank may be suitable for one quality segment but not another. It may be usable under design or craft conditions or ruled out because of individual characteristics or their interaction.

Assessment is consequently not carried out according to a uniform scheme that could be applied irrespective of context and intended use. It combines visible material characteristics with professional experience, expectations regarding the future function of the bow stick, the intended quality segment, and the question of whether the material can realistically be used in a particular scenario.

The planned study addresses this professional assessment practice. It examines how specialists assess *Paubrasilia echinata* bow blanks, which characteristics influence their decisions, and where common assessment patterns or differing professional judgements can be identified.

1.2. Research Gap

Botanical, historical, ecological, and materials-science aspects of *Paubrasilia echinata* have been addressed in numerous publications. These include studies of the species' distribution and conservation status, wood anatomy, growth and material properties, physical and mechanical parameters, as well as reforestation, provenance, and sustainable resource use.

By contrast, there has been only limited research into how specialists assess the suitability of individual bow blanks in their professional practice. Specialist literature, workshop traditions, and individual accounts of experience contain numerous references to selection criteria. However, an internationally comparative empirical study that records these criteria systematically, differentiates them by material characteristic, and relates them to intended use has so far been available only in rudimentary form.

There is therefore no robust documentation of:

- which characteristics specialists regularly regard as relevant to their decisions;
- which degrees of expression are assessed as acceptable, acceptable with limitations, or unacceptable;
- how the position of a characteristic on a blank influence its assessment;
- what differences exist between student, orchestral, and master/soloist bows;



- in which areas bow makers, violin makers, and dealers express similar or differing assessments; and
- what role physical material parameters play within the professional overall assessment.

This gap concerns more than the description of the practice of the craft. It also makes it more difficult to distinguish professionally between questions in which the actual usability of bow blanks, the appraisal of existing bow sticks, and the responsible use of limited material resources are relevant.

1.3. Objectives

The aim of the study is to record professional assessment practice relating to *Paubrasilia echinata* bow blanks systematically and internationally. It is intended to document the criteria by which specialists judge the suitability of individual blanks and the importance they attach to different material characteristics about their later use.

The investigation will address the following questions in particular:

1. which anatomical, structural, visual, and physical material characteristics are relevant in professional assessment;
2. which characteristics regularly lead to rejection and which can be accepted depending on degree, position, combination with other characteristics, or intended quality segment;
3. how assessment standards differ between student, orchestral, and master/soloist bows;
4. what commonalities and differences exist between the perspectives of bow makers and those of violin makers and dealers;
5. how experience-based professional judgements relate to objectively measurable material parameters;
6. whether and how assessment standards have changed under altered conditions of material availability, professional practice, and the regulatory environment; and
7. what indications the findings may provide for differentiated use of existing bow blanks and bows.

The investigation is not intended to establish binding thresholds for the suitability of bow blanks. Rather, it is intended to make visible the assessment patterns present within the international professional community, describe their differences transparently, and thereby provide a basis for further scientific, professional, and educational work.

1.4. Key Terms and Delimitations

In the following, the term “specialists” collectively refers to bow makers, violin makers, and dealers unless a distinction between the professional groups is made explicitly.

A bow blank is understood as a piece of *Paubrasilia echinata* wood intended for making a bow stick or assessed with such use in mind. The study concerns not wood volume or raw material in general but bow blanks as concrete starting materials for stringed-instrument bow making.

The suitability of a bow blank refers to the professional judgement as to whether it is suitable, suitable with limitations, or unsuitable for a particular future use in bow making. This judgement may concern the blank, particular areas of the intended bow stick, or a specific quality segment.

The study distinguishes three quality segments:

- **student bows, intended for entry-level and training contexts;**
- **orchestral bows, intended for advanced musicians and professional orchestral work;**
- **master/soloist bows, which place the highest demands on material, workmanship, and subsequent musical use.**



These categories serve to compare different professional requirements. They do not replace individual quality judgements or company-specific or regional classifications.

The study also distinguishes between prospective assessment of bow blanks for new making and retrospective assessment of existing bows. The two perspectives are connected but arise from different decision situations. While bow makers primarily assess the later working and function of a blank, violin makers and dealers also take into account—for existing bows—condition, repair history, restorability, market acceptance, documentation, and legal marketability under conservation law.

1.5. Underlying Assumption of the Study

The study proceeds from the testable guiding assumption that professional assessment of a bow blank cannot be reduced to a single criterion. Its suitability is assumed to be shaped by the interaction of several factors.

These factors include the relevant material characteristic, its degree, its position on the blank or future bow stick, the intended quality segment, other possible material characteristics, physical properties, expected workability, and the professional experience of the person making the assessment.

This guiding assumption is not treated as a fixed result. It will be examined and differentiated based on the standardised survey, supplementary free-text responses, and, where appropriate, structured expert interviews.

2. Research Questions and Guiding Assumptions

2.1. Development of the Research Questions

The research questions arise from the objective of recording professional assessment practice relating to *Paubrasilia echinata* bow blanks transparently and analysing it scientifically. They are linked to the data-collection instrument, the two survey routes, the standardised image references, and the catalogue of evaluation-oriented research questions.

The investigation is not designed to establish a binding ranking of individual material characteristics or to define universally applicable technical thresholds. Instead, it is intended to show which assessment patterns exist in international professional practice, where agreement is evident, and where differences arise according to professional group, experience, quality segment, or intended use.

The individual research questions will be addressed using quantitative and qualitative methods. Standardised response formats permit comparison of assessments. Free-text fields and, where appropriate, in-depth expert interviews are intended to capture professional reasoning, exceptions, and relationships that cannot be fully represented in predefined response categories.

The research questions are operationalised in the data-collection instrument of the planned online survey. It begins with question blocks 1 and 2, which are common to all participants. Following the profile section, participants are automatically directed to Routing A for bow makers or Routing B for violin makers and dealers. All participants then proceed to the shared question block 4. The complete question catalogue is documented in the appendix as part of the data-collection instrument.

2.2. Central Research Questions

The study addresses the following central question:

By what criteria do specialists assess the suitability of individual *Paubrasilia echinata* bow blanks for modern stringed-instrument bow making?



1. Which anatomical, structural, visual, and physical material characteristics are relevant to this assessment?
2. Which material characteristics regularly lead to rejection of a bow blank, and which may be accepted depending on degree, position, combination with other characteristics, or intended quality segment?
3. What role does the position of a material characteristic within the intended bow stick play, in the head, neck, middle, winding area, and visible end of the stick?
4. How do assessment standards differ between student, orchestral, and master/soloist bows?
5. What relationships exist between the assessment of individual material characteristics, expected workability, later material behaviour, and intended use of a bow blank?
6. What significance do physical properties such as density, modulus of elasticity, speed of sound, stick-only weight, total finished-bow weight, and balance point have within the professional overall assessment?
7. Which combinations of physical properties are assessed in professional practice as favourable, suitable with limitations, or problematic?
8. How do bow makers' assessments when selecting blanks differ from those of violin makers and dealers when appraising existing bows?
9. Which material characteristics primarily influence selection for new making, and which become particularly important in existing bows with respect to condition, repair, restoration, market acceptance, marketability, or long-term use?
10. What commonalities and differences exist between professional groups, levels of experience, specialisations, and regional contexts?
11. In which areas is there evidence of broad professional consensus, and for which characteristics or assessment questions do views differ substantially?
12. Have assessment standards changed over time, particularly in relation to changed material availability, professional experience, and the development of specialist knowledge?
13. What conclusions may be drawn from the findings for differentiated and resource-conscious use of existing bow blanks and bows?
14. To what extent can the findings help describe the actual professional usability of bow blanks more transparently, without reducing it to considerations of volume, weight, or individual measurements?

Questions concerning documentation, evidence, and legal marketability under conservation law are addressed exclusively in Routing B. They relate to existing bows and their practical appraisal in a professional context. They must therefore be clearly distinguished from the material-related core questions concerning the technical and craft suitability of a bow blank.

2.3. Guiding Assumptions of the Study

The investigation proceeds from several guiding assumptions. They do not serve to confirm predetermined expectations, but to structure data collection and analysis. They will be critically examined in the light of the data collected and adjusted where necessary.

First Guiding Assumption:

The assessment of bow blanks is fundamentally based on an overall appraisal of several interrelated material characteristics. Individual characteristics may be relevant to a decision, but their significance often becomes apparent only in interaction with other properties of the material.



Second Guiding Assumption:

The professional relevance of a material characteristic depends not only on its presence. Its degree, extent, position within the intended bow stick, and relation to other material characteristics may also be decisive.

Third Guiding Assumption:

The acceptability of a material characteristic may differ according to the intended quality segment. A characteristic that is not acceptable for a master/soloist bow may, under certain conditions, be professionally defensible in an orchestral or student bow.

Fourth Guiding Assumption:

Assessment standards differ between professional groups. At the same time, the study will examine whether a shared core of fundamental professional assessment criteria can be identified.

Fifth Guiding Assumption:

The study will examine whether, and to what extent, comprehensible relationships exist between professional assessments and objectively measurable material parameters. These parameters may support professional assessment, but they do not fully explain the complexity of practical selection decisions.

Sixth Guiding Assumption:

Selecting a bow blank for new making and assessing an existing bow are related but not identical decision situations. Existing bows introduce additional considerations, including condition, repairability, restoration, market acceptance, documentation, and legal marketability.

Seventh Guiding Assumption:

Changed conditions of material availability, professional exchange, and the regulatory environment may have led to further development of professional assessment standards. The study will examine whether this is reflected in participants' assessments.

Eighth Guiding Assumption:

The study examines whether professional suitability can be described more precisely than through the simple opposition of "usable" and "not usable".

2.4. Significance for Subsequent Analysis

The research questions and guiding assumptions provide the frame of reference for subsequent data analysis and for interpretation of the findings. They serve to order the data systematically and distinguish between different levels of statement.

Three levels must be distinguished:

First, the direct survey results, such as frequencies, means, distributions, or differences between groups.

Second, the professional interpretation of those results, supported by free-text responses, comparison between survey routes, and, where appropriate, expert interviews.

Third, possible further considerations for research, education, professional practice, and resource use.

This distinction is essential to avoid drawing broader conclusions from individual response patterns than the data support. The findings are intended to document and place professional assessment processes in context, not to replace individual decisions or prescribe binding limits of suitability. The methodological implementation and planned analytical approaches are explained in more detail in Chapters 3 and 4.



3. Research Design and Methodology

3.1. Basic Structure of the Study

The study is designed as an international empirical investigation using a mixed-methods approach. It combines standardised surveys with supplementary qualitative data collection and, where available, information on objectively measurable material parameters.

This approach recognises that assessment of a bow blank rests on experience-based professional judgements while also being influenced by observable and, in some cases, measurable material properties. The investigation is therefore intended neither to collect individual experience alone nor to analyse measurable parameters in isolation. Rather, it seeks to relate the two levels to one another in a methodologically transparent way.

The international specialist survey is the principal data-collection instrument. It is intended to provide comparable assessments of material characteristics, degrees of expression, quality segments, and selection decisions. Supplementary expert interviews will enable more detailed interpretation of individual findings, especially where assessments differ strongly, unexpected patterns emerge, or professional explanations are required for interpretation.

Where the relevant information is available and methodologically comparable, physical parameters such as density, modulus of elasticity, speed of sound, weight, or balance point may also be considered. These parameters are not treated as independent proof of suitability. Their role is to make possible relationships with professional assessment decisions visible.

The study therefore proceeds on three connected levels:

1. the standardised recording of professional assessments;
2. the professional explanation and contextualisation of selected findings; and
3. cautious examination of possible relationships between experience-based judgements and measurable material properties.

3.2. International Specialist Survey

The survey is designed as a standardised international online study. It is addressed to specialists with professional experience in selecting, working, assessing, restoring, repairing, or trading in stringed-instrument bows made from *Paubrasilia echinata*.

A preview of the online survey is currently available at pau-brasil.info and is expected to remain accessible until 31 August 2026. The same web page also provides a link to this document.

Online implementation permits international participation while also allowing differentiated management of the survey. Shared core questions are presented to all participants. Based on information about professional activity, participants are automatically directed to the relevant survey route.

The data-collection instrument comprises four overarching areas:

- general information on professional experience and activity;
- material-related assessment of individual characteristics;
- route-specific questions concerning new making or existing bows; and
- supplementary questions on physical parameters, assessment methods, and professional context.

Participants are not asked to formulate abstract ideals. Instead, they are asked how they assess typical characteristics and make decisions in their actual professional practice.



3.3. Survey Route A: Bow Makers

Survey Route A is addressed to bow makers who select, prepare, work, or use bow blanks for new making.

It focuses on assessment of bow blanks and on judging their possible use for the future bow stick. It records:

- selection and assessment criteria for bow blanks;
- anatomical, structural, and visual material characteristics;
- the significance of the degree and position of a characteristic;
- expected effects on workability, bending, shape stability, and long-term material behaviour;
- assignment to student, orchestral, or master/soloist bows;
- selection methods used, including visual, manual, experience-based, and measurement-based approaches;
- physical parameters and practical target ranges for weight, balance point, and other characteristics of newly made bows; and
- possible changes in professional assessment standards over time.

The questions concern the part of the blank intended for the future bow stick. They therefore record not only the presence of a characteristic, but also its expected position within the usable areas of the blank.

The route-specific continuation intended for bow makers, including question sequence, rating matrices, and supplementary free-text fields, is set out in Routing A of the data-collection instrument documented in the appendix.

3.4. Survey Route B: Violin Makers and Dealers

Survey Route B is addressed to violin makers and dealers who assess, purchase, sell, broker, restore, or repair existing bows.

This survey route records how visible and structural characteristics are assessed on finished or existing bow sticks. It does not focus on technical considerations alone. Condition, repair history, restorability, market acceptance, value development, documentation, and legal marketability under conservation law are also considered.

It records, in particular:

- assessment of visible and structural material characteristics in existing bows;
- the professional significance of a characteristic's position, degree, and possible development;
- effects on technical appraisal, market acceptance, and marketability;
- differences between quality and market segments;
- the significance of repairs, restorations, and known damage histories; and
- the handling of documentation and supporting evidence, insofar as these are relevant to professional assessment of an existing bow.

Survey Route B supplements the perspective of new making with the assessment of material that has already been worked and of existing bows. Their properties, risks, and acceptance may become apparent only in use or through later examination.

The route-specific continuation intended for violin makers and dealers, including question sequence, rating matrices, and supplementary free-text fields, is set out in Routing B of the data-collection instrument documented in the appendix.



3.5. Standardised Image References

Standardised image references are used to assess visible material characteristics. They are intended to provide as consistent a basis as possible so that different participants can assess comparable degrees of material characteristics.

Depending on the characteristic, these references may include photographs, technical drawings, schematic representations, comparative views, or image sequences. Not every characteristic can be represented adequately by a single image. Complex or position-dependent characteristics may therefore require a combination of written description and several visual representations.

The image references serve solely to explain. They neither define fixed thresholds nor suggest a particular assessment. Their function is to reduce misunderstanding and support as consistent as possible a use of the key terms.

For characteristics that become apparent principally through working, bending, material stress, long-term observation, or repair experience, static images are regularly insufficient. In such cases, a precise written description provides the primary basis for assessment. Image material may be used in addition where it improves understanding.

3.6. Illustrative Screenshots of the Online Implementation

The following screenshots (pau-brasil.info) illustrate the intended flow of the online survey: the shared entry section with consent and professional profile; the route-specific continuation for bow makers; the explanation of a material characteristic using standardized image references; and the position-specific rating matrix. They are included solely to illustrate the technical implementation; the final design and terminology will be reviewed during the pretest.



Figure 1: Language-selection landing page of the international survey on *Paubrasilia echinata*, providing access to the six available language versions.

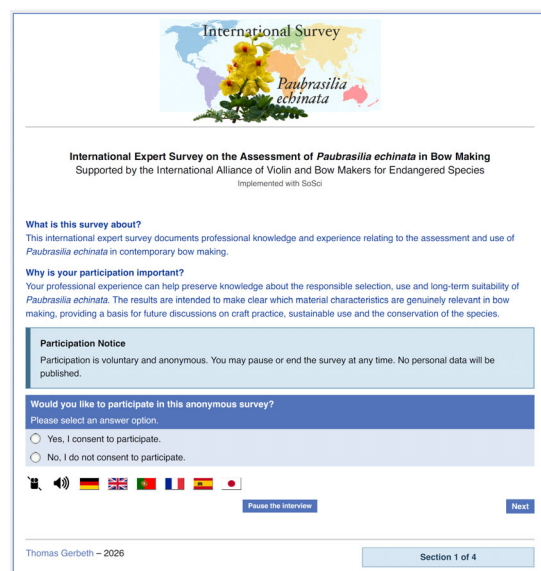


Figure 2: Introductory survey page outlining the study's purpose, participation conditions and respondent consent.



International Survey

Paubrasilia echinata

Which professional perspective best describes your work?
Please select one answer option. (If both fields of activity are selected, the checkmarks will be automatically placed.)

☐ Bow maker / Material selection and construction of bows

☐ Violin maker, dealer or other specialist / trade, appraisal, restoration, repair and existing bows

☐ Both Areas of Activity

Which continent do you currently live in?
Please select one continent.

[Please choose] ▾

🇩🇪 🇬🇧 🇫🇷 🇪🇸 🇯🇵

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Figure 3: Survey page collecting respondents' professional perspective and continent of residence for route-specific questionnaire allocation.

International Survey

Paubrasilia echinata

In which quality segments are you predominantly active professionally?
Please select all quality segments in which you are professionally active.

☐ Student Bows

☒ Orchestra Bows

☒ Master/Soloist Bows

☐ All of the Above

Important note: Your selection determines which quality segment the following detailed questions and ratings refer to. Please select only segments for which you can assess the material characteristics professionally.

Reference quality segment for the following detailed ratings
Select the quality segment to which your subsequent detailed ratings refer.

☐ Orchestra Bows

☒ Master/Soloist Bows

Bows intended for the highest individual artistic and tonal requirements. This denotes a top or soloist segment, not a quality class standardised worldwide.

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Figure 4: Survey page identifying respondents' professional quality segments and selecting the reference segment for subsequent detailed material ratings.

Preview for Questionnaire "base"



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Twisted Grain

Reference quality segment for your ratings: Master / soloist bows

Your assessment

You will assess the acceptability of slight twisted grain in the five sections of the bow stick. Select a value for "All areas" only when it should initially apply to every section; you may then adjust individual ratings. Please select "Cannot assess" for any section you cannot assess with confidence.

Explanation

Twisted grain refers to a helical rotation of the grain direction around the longitudinal axis of the bow blank or of the area intended for the finished bow stick. It is distinct from diagonal grain direction, in which the grain runs at an angle but does not rotate helically around the longitudinal axis. The illustrations are intended solely for professional orientation. They do not establish a technical threshold and do not anticipate your assessment.



Slight

What is the acceptability of slight twisted grain?

Apply to all areas	Unacceptable	Completely Acceptable	Cannot Assess
All areas			☐
Head Area			☐
Upper Section of the Stick			☐
Middle Section of the Stick			☐
Winding Area			☐
Visible End of the Stick			☐



Moderate

What is the acceptability of moderate twisted grain?

Apply to all areas	Unacceptable	Completely Acceptable	Cannot Assess
All areas			☐
Head Area			☐
Upper Section of the Stick			☐
Middle Section of the Stick			☐
Winding Area			☐
Visible End of the Stick			☐



Pronounced

What is the acceptability of pronounced twisted grain?

Apply to all areas	Unacceptable	Completely Acceptable	Cannot Assess
All areas			☐
Head Area			☐
Upper Section of the Stick			☐
Middle Section of the Stick			☐
Winding Area			☐
Visible End of the Stick			☐

How do your acceptability thresholds for this selection criterion differ between lower quality segments and the highest quality segment you work with?

☐ No change to the acceptability limits
☐ Minor change in acceptability limits
☐ Significant expansion of acceptability limits
☐ Cannot Assess
☐ Other, namely:

Note

If you would like to explain your assessment or add any special conditions, exceptions or observations, you may enter them here voluntarily.

Comment









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Figure 5: Example of the position-specific rating matrix used to assess the acceptability of slight, moderate and pronounced twisted grain across five sections of the bow stick.



3.7. Assessment System and Material Characteristics

The survey records more than twenty typical material characteristics and structural irregularities. These include, among other things, characteristics of grain direction, growth-ring structure, porosity, visible inclusions, knot traces, colour variation, and other features regarded as relevant to assessment in professional practice.

Where professionally appropriate, assessment is differentiated by three degrees of expression:

- slight;
- moderate; and
- pronounced.

For position-dependent characteristics, a further distinction is made between the head area, neck area, middle section of the bow stick, winding area, and visible end of the stick.

Participants assess the professional acceptability of each characteristic with reference to the intended quality segments. The response options “Cannot assess” and “Not applicable” are also available. This is intended to prevent lack of experience or unsuitable questions from producing artificially forced ratings.

The scales are not to be understood as a rigid classification. Rather, they provide a structured way to record professional assessments comparably. Subsequent analysis must consider that assessment of an individual characteristic may depend on the relevant context, its possible interaction with other characteristics, and its position.

The individual material characteristics, their explanations, the assessment levels, and the position-specific questions are set out verbatim in the question catalogue of the online survey. The shared basic structure, automatic routing to Routing A or Routing B, and the final shared question block 4 are documented transparently in the appendix.

3.8. Expert Interviews

Supplementary expert interviews are envisaged as a qualitative method. They do not replace the international survey but explain and contextualise its findings.

Interviewees are to be selected deliberately to include different professional perspectives, levels of experience, regional contexts, and fields of work. A prerequisite is demonstrable practical experience in selecting, working, or assessing *Paubrasilia echinata* bow blanks or bows.

The interviews may serve to:

- explain striking agreements or differences in the survey findings;
- explore in greater depth the significance of individual material characteristics in practical decision-making;
- capture relationships between characteristics, quality segments, and working decisions;
- describe more precisely the differences between selecting a bow blank and assessing an existing bow; and
- place open questions concerning material behaviour, possible uses, and professional trade-offs in context.

The interviews will be analysed thematically and kept clearly separate from the survey’s quantitative results. Statements by individual interviewees will not be treated as an expression of consensus, but as in-depth professional perspectives.



3.9. Pretest and Quality Assurance

Before international data collection begins, the data-collection instrument, including its shared and route-specific elements, is to be examined in a scientifically supervised pretest.

The pretest will also examine whether specialists from different professional contexts and language areas understand key terms, degrees of expression, and image references in sufficiently comparable ways. It must be determined whether reference material could unintentionally suggest a particular assessment or if it does solely describe the relevant characteristic unambiguously.

The pretest will clarify:

- whether questions, terms, and instructions are understood unambiguously;
- whether the distinction made between *slight*, *moderate*, and *pronounced* characteristics is sufficiently clear;
- whether image references and written explanations are correctly matched;
- whether position-dependent questions are clearly distinguished from general assessment questions;
- whether the distinction between Survey Routes A and B remains comprehensible throughout the survey;
- whether response scales and tables can be used consistently;
- whether “Cannot assess” and “Not applicable” are understood as intended;
- whether the terminology used remains professionally consistent in all language versions;
- whether the scope and completion time of the survey are appropriate;
- whether the technical implementation of survey routing functions reliably; and
- whether the open comment fields provide sufficient space to explain professional relationships or interactions among several characteristics.

The results of the pretest will inform revision of the data-collection instrument, the image references, and the technical implementation. This applies both to shared question blocks (1, 2, and 4) and to the respective route-specific continuations in Routing A and Routing B. The international study will begin only thereafter. The further sequence of validation and implementation is set out in Chapter 7.



4. Sample, Data Collection, and Analysis

4.1. Target Group and Participation Requirements

The investigation is addressed to specialists with practical experience in selecting, working, or assessing *Paubrasilia echinata* bow blanks, bow sticks, or existing stringed-instrument bows. This includes bow makers, violin makers, and dealers. Depending on their professional field, restorers or other specialists may also be included where their experience is relevant to the respective questions.

Participation does not require a uniform form of training, a specified number of years in the profession, or membership of a particular institution. What matters is that respondents are or have been demonstrably involved in decisions concerning selection, assessment, working, restoration, repair, or trade.

The study does not claim statistical representativeness in the sense of a random sample of all specialists worldwide. Such a population can neither be defined unequivocally nor accessed in full. Instead, the aim is to obtain a professionally robust and internationally diverse sample that makes different professional perspectives, levels of experience, and regional contexts visible.

4.2. Recruitment of Participants

Invitations to participate are to be distributed through international professional networks, professional associations, training institutions, specialist events, personal professional contacts, and suitable digital communication channels.

Recruitment should take care not to reach only people who are particularly well connected in individual countries, organisations, or professional groups. Wherever possible, the sample should reflect a range of activities, including new making, repair, restoration, trade, brokering, appraisal, and teaching.

Participation is voluntary. The survey should be designed so that specialists with limited time can also take part. At the same time, the questions must remain sufficiently differentiated to permit professionally robust findings. This tension between completion time and depth of knowledge must be considered in further revision of the instrument and in the pretest.

4.3. Recording Professional Background

Information on professional background will be collected to contextualise responses. It does not serve to evaluate individuals but permits differentiated analysis of possible differences between fields of activity and experience profiles.

The following may be recorded in particular:

- principal professional activity and further fields of activity;
- number of years in the profession;
- extent and frequency of work with *Paubrasilia echinata* bow blanks or existing bows;
- experience of new making, material selection, repair, restoration, appraisal, or trade;
- use of physical measurement methods;
- regional or international orientation of professional activity; and
- experience in assessing different quality segments.

The information is to be collected in a way that avoids, as far as possible, inferences about individual persons. This requires a sufficiently broad presentation, particularly for small professional groups or narrowly defined regional subsamples.



4.4. Conduct of Data Collection

The online survey is to remain open for a clearly defined period. Before the international field phase begins, the data-collection instrument, image references, response scales, and technical routing will be reviewed in a pretest.

During the field phase, no substantive changes are to be made to core questions, scales, or image references unless compelling technical or methodological reasons require them. Any necessary changes must be documented and taken into account in subsequent analysis.

The survey is to be available in several language versions. The translations must be aligned in technical terminology so that key terms carry the same meaning in all language versions. This applies in particular to material characteristics, degrees of expression, positions along the bow stick, quality segments, and response categories.

Multiple participation should, as far as technically possible, be prevented or made detectable. An appropriate balance must be maintained between data quality and anonymity.

4.5. Data Protection and Handling of Sensitive Information

The survey is not to request information that could identify individual persons, clients, specific transactions, instruments, bow blanks, or possible legal infringements.

Questions concerning documentation, access to information, or legal marketability under conservation law are formulated in general terms. They concern professional experience, perceived difficulties, clarity of information, and possible practical effects. They do not serve to collect individual cases or evaluate particular decisions.

Personal data are collected only to the extent necessary for implementation, analysis, and, where applicable, voluntary participation in follow-up interviews. Contact details for interviews or follow-up questions are to be stored separately from the survey data.

Analysis and publication of the findings will in principle take place in anonymised and aggregated form. Statements concerning small subgroups will be reported separately only where identification of individual persons can be excluded.

4.6. Quantitative Analysis

Quantitative analysis is differentiated by material characteristic, degree of expression, quality segment, and, where applicable, position within the bow stick. This differentiation does not apply to characteristics for which no position-specific assessment is provided.

The response categories “Cannot assess” and “Not applicable” are reported separately and analysed. They are neither neutral nor negative assessments, and they are not treated as missing values.

Physical information is compared directly only where the object of measurement, unit, and, where available, underlying measurement method are adequately documented. Information based on differing or incompletely described measurement conditions is reported separately or included in the analysis only descriptively.

For individual material characteristics, the analysis will consider in particular:

- frequencies of the respective assessments;
- distribution of acceptability by degree of expression;
- differences between positions along the bow stick;
- differences between student, orchestral, and master/soloist bows;
- assessments within and between the survey routes;



- possible relationships with professional experience, field of activity, or selection methods; and
- relationships between professional assessments and voluntarily reported physical parameters.

Depending on the scale level and data quality, medians, interquartile ranges, frequency distributions, suitable measures of dispersion, and, where methodologically justified, means may be reported. Group comparisons serve primarily exploratory analysis. Inferential statistical methods will be used only where sample size, data distribution, and comparability of the groups permit.

Small subgroups will not be overinterpreted. Regional, national, or professional differences will be examined in greater depth only where the number of responses and composition of the subsample permit professionally meaningful contextualisation. Otherwise, they will be treated as indications of possible questions for further research.

A high proportion of “Cannot assess” or “Not applicable” responses may indicate that characteristics, questions, or decision situations are less familiar to certain professional groups or require more precise contextualisation later in the study.

4.7. Qualitative Analysis

The qualitative data comprise free-text responses, supplementary comments, and, where applicable, the findings of structured expert interviews.

Analysis is thematic. Central themes may include, for example:

- professional reasoning for acceptance or rejection of particular characteristics;
- the significance of combinations of several material characteristics;
- differences between an ideal conception and practical use;
- experience with workability, bending, shape stability, and long-term behaviour;
- differences between selecting a bow blank and assessing an existing bow;
- reasons for divergent assessments within or between professional groups;
- changes in professional assessment standards; and
- aspects of differentiated and resource-conscious material use.

Qualitative statements explain and contextualise quantitative findings. They do not replace statistical generalisation and must not simply be presented as a majority view. Conversely, they may reveal relationships that standardised response formats alone do not capture sufficiently.

4.8. Integration of the Data

Quantitative and qualitative analysis will be integrated through a multi-stage process.

First, the standardised assessments will be analysed separately by material characteristic, degree of expression, position, and quality segment. Conspicuous patterns will then be examined more closely: for example, those of clear agreement, substantial dispersion, or differences between professional groups.

In a further step, free-text responses and, where appropriate, interview statements will be used to place these patterns in professional context. A clear distinction must be drawn between what follows directly from the data and what is formulated as a professionally grounded interpretation of the findings.

Indications of interaction between several material characteristics will first be analysed thematically based on free-text responses and supplementary explanations. They will not automatically be treated as statistically established relationships. Further interpretation will occur only where corre-



sponding patterns are clear in the standardised responses, free-text data, or supplementary expert interviews.

The study will therefore distinguish three levels:

1. direct empirical findings, such as frequencies, distributions, and differences between groups;
2. professional contextualisations based on free-text responses, interviews, and the linkage of several findings; and
3. further considerations that may arise for education, research, professional practice, and resource use.

This distinction is essential so that the study does not claim greater explanatory power than its data support. It also accords with the basic purpose of the project: to document professional assessment practice systematically without prematurely deriving binding technical, economic, or legal standards from it. The principles for contextualising the findings are developed further in Chapter 5.

5. Discussion and Contextualisation of the Findings

5.1. Function of the Discussion

The discussion serves to place the findings of the international survey in their professional and methodological context. It goes beyond merely presenting frequencies, distributions, and group differences, but may not anticipate conclusions that are not supported by the data collected.

The starting point is the directly observable survey findings. These are then related to the free-text responses, supplementary expert interviews, available materials-science knowledge, and existing specialist literature. The basis on which each statement rests must remain clear throughout.

The discussion therefore distinguishes three levels:

1. empirically supported findings that emerge from the standardised responses;
2. professional interpretations supported by free-text responses, expert interviews, material experience, or external literature; and
3. further considerations arising from the findings for professional practice, education, material documentation, and differentiated use of existing resources.

This distinction is particularly important because the study examines complex professional assessment processes. It can document how specialists assess material characteristics. It cannot, however, determine the actual scale of available raw-material stocks or derive conclusions about biological population trends or ecological sustainability from the responses alone.

5.2. Technical Suitability, Practical Usability, and Quality Segment

A central subject of the later discussion will be the distinction between technical suitability, practical usability, and assignment to a particular quality segment.

A bow blank may have technical properties that make its use possible in principle without making it equally suitable for every bow or quality segment. Conversely, an individual visible characteristic may initially appear problematic but, in the specific context, be professionally acceptable if it is slight, located in a less critical position, or compensated for by other material properties.

The discussion should therefore not proceed from a simplified opposition between “good” and “bad” material. What matters is the requirements made of the future bow stick, the characteristics that occur and the context in which they occur, and the professional consequences that follow.



Attention will be given to whether different patterns of acceptability emerge for student, orchestral, and master/soloist bows. Such differences should not be understood as deviations from a general quality standard, but as evidence that professional assessment is always relative to intended use.

5.3. Degree, Position, and Interaction of Material Characteristics

The discussion recognises that the mere presence of a characteristic often does not provide sufficient information about its professional relevance.

For many characteristics, the study will examine whether, and to what extent, assessment depends on degree of expression. A slight characteristic may be judged acceptable, while the same characteristic, when pronounced, may lead to restriction or rejection of a blank. Position within the intended bow stick may likewise be decisive. A characteristic in the head area may be assessed differently from one in the middle section, winding area, or visible end of the stick.

The study will also examine whether certain combinations of characteristics carry greater weight in practice than individual characteristics alone. Analysis can describe only relationships that are sufficiently supported by the data. Where free-text responses or interviews point to more complex interactions, these will be identified as professional explanations rather than presented as statistically established rules.

5.4. Physical Properties and Professional Overall Assessment

A further focus of the later discussion is the relationship between physical material parameters and professional assessment decisions.

Density, modulus of elasticity, speed of sound, weight, and balance point can provide valuable indications of properties of a bow blank or bow stick. Their explanatory value remains limited, however, if they are considered without reference to grain direction, growth structure, workability, capacity for bending, shape stability, and the intended quality segment.

The study is not designed to determine whether individual measurements can replace professional assessment. Rather, it asks what importance specialists attach to these parameters, which measurement methods they use, and how measured values relate to experience-based selection decisions.

Where discernible relationships emerge, they may be interpreted as indications of a link between objectively measurable properties and professional assessment practice. The absence of such relationships, or only weak relationships, would also be a relevant result. It would show that assessment of a bow blank cannot be adequately described by measurements alone.

5.5. Differences between Survey Routes A and B

Survey Routes A and B capture related but different professional decision situations.

Bow makers assess bow blanks prospectively. Their judgement concerns subsequent working, the technical development of the bow stick, and the expected function of the finished bow. Violin makers and dealers, by contrast, predominantly assess already worked bow sticks or existing bows. For them, visible changes, repairs, restorations, documented histories, market acceptance, and legal marketability under conservation law may also be relevant.

The discussion should therefore not interpret differences between the survey routes prematurely as contradictions. They may instead reflect different professional perspectives. A characteristic considered still acceptable in selecting a blank may be assessed differently in an existing bow, for example because it affects long-term stability, repairability, value development, or market acceptance.



5.6. Resource Use and Professional Usability

The findings may indicate how differentiated specialists' handling of existing bow blanks and bows is. A clear distinction must be drawn between professional assessment of an individual blank and broader statements about material availability.

The study does not examine the total volume of material available and does not calculate any universally applicable material yield. It can examine the extent to which practical usability can be inferred from weight, volume, or number of pieces alone. Whether a blank can realistically be used in professional terms depends on its individual characteristics, intended quality segment, and the specific craft decision.

Depending on the findings, the investigation may support a more differentiated view. It may show that material apparently unsuitable for the highest requirements can, under certain conditions, be usable for other purposes or quality segments. Conversely, a bow blank of adequate volume may be unsuitable for its intended purpose because of problematic structural or functional characteristics.

Further considerations on resource management, material availability, or possible conversion models must be explicitly identified as interpretation. They must not be confused with direct measurements of stocks or biological sustainability.

Current international working documents identify, in this context, questions of traceability, quality grading, reasons for rejection, and practical material yield.

5.7. Documentation and Legal Marketability

Questions concerning documentation, access to information, and legal marketability under conservation law are addressed exclusively in relation to existing bows and Survey Route B.

They do not concern the technical suitability of a bow blank. Instead, they relate to the practical consequences of evidence, documentation records, and access to information for appraisal, repair, restoration, sale, brokering, travel, and cross-border activity.

The discussion must clearly distinguish three levels:

- the technical and craft appraisal of a bow;
- its economic or market-related assessment; and
- its documentary and legal marketability under conservation law.

These levels may influence one another in practice, but they are not identical. A technically sound and professionally usable bow may, for example, be restricted in its marketability by insufficient documentation. Conversely, complete documentation does not replace professional assessment of a bow's condition, stability, or musical quality.

In this area, the study serves exclusively to record professional experience and perceived effects. It makes no statement about the legal status of individual blanks, bows, transactions, or persons.

5.8. Limitations of the Study

The evidential value of the study depends substantially on the composition and size of the sample, the comparability of the terms used, the quality of translations, and the clarity of the image references.

The standardised image references provide a common basis for assessing typical characteristics. They cannot, however, replace physical examination of a particular bow blank. Characteristics such as working behaviour, bending behaviour, internal stress, tonal development, or long-term shape stability can be captured only to a limited extent through images or brief descriptions.



Regional traditions, different training pathways, individual workshop experience, and different market conditions may also influence responses. Differences between groups must therefore initially be understood as empirical observations. Their causes may be contextualised through supplementary qualitative data but cannot always be explained conclusively.

Small subgroups and rarely represented professional profiles will be interpreted cautiously. They may point to relevant differences, but do not automatically permit general statements. The study should therefore be understood as a basis for further research, not as a final definition of assessment standards.

6. Planned Presentation of Findings, Possible Conclusions, and Outlook

6.1. Integration of the Findings

The subsequent integration is intended to present the findings of the individual components of the study as a coherent whole. It should not merely repeat results but relate the different levels of the study: standardised assessments of material characteristics, differences between quality segments and professional groups, information on physical parameters, and supplementary qualitative explanations.

The following questions will be central in particular:

- Which characteristics influence the fundamental usability of a bow blank?
- Which characteristics lead, depending on degree, position, or combination with other properties, to limitations or rejection?
- What differences exist between student, orchestral, and master/soloist bows?
- What significance do physical properties have in relation to visual and experience-based assessment?
- Which selection methods are used in professional practice?
- In which areas are common assessment patterns evident, and where do professional assessments differ?
- What additional considerations arise for existing bows with respect to condition, repair, restoration, market acceptance, documentation, and legal marketability under conservation law?
- What indications arise for professionally differentiated use of existing bow blanks and bows?

The integration must expressly distinguish between findings that follow directly from the data and statements formulated as professional interpretation or further consideration.

6.2. Conclusions

The study's conclusions are intended to describe international professional assessment practice, not to establish binding technical or economic standards.

Where the survey reveals a high degree of agreement, areas of broad professional consensus may be identified. Where assessments diverge substantially, such differences should not be understood as a deficiency of the study. They may instead show that certain material characteristics are assessed in a context-dependent way, that different professional experiences play a role, or that regional, organisational, and historical assessment standards remain influential.

Provided that the scope and quality of the data permit, the study is designed to make statements about:



- typical assessment patterns for anatomical, structural, visual, and physical material characteristics;
- different thresholds of acceptability by degree and position;
- differences between quality segments;
- commonalities and differences between bow makers, violin makers, and dealers;
- the significance of experiential knowledge in relation to measurable material parameters;
- the role of condition, repair, restoration, market acceptance, and marketability in existing bows; and
- the limits of considering usability solely in terms of volume, weight, or individual measurements.

In particular, the study will examine the extent to which the professional suitability of a bow blank can be explained by individual measurements or isolated visible characteristics, and the importance of an overall assessment combining material structure, position and degree of characteristics, physical properties, intended use, and professional experience.

6.3. Recommendations for Professional Practice

Recommendations arising from the study must be clearly identified as such. They must not assume the character of binding prescriptions where their basis consists only of observed assessment tendencies or professional interpretations.

Possible recommendations may concern the following areas.

For Bow Makers

The findings may help make typical selection criteria more transparent, facilitate communication about material properties, and make the assignment of bow blanks to different quality segments more comprehensible.

For Violin Makers and Dealers

The investigation may support appraisal of existing bows by placing visible material characteristics, repair considerations, market acceptance, and long-term use more firmly in a shared professional context.

For Education and Knowledge Transfer

The documented assessment patterns may provide a basis for describing implicit experiential knowledge more clearly and making it useful for teaching, master training, and professional exchange. This would not replace direct experience of materials, but could communicate it in a more structured way.

For Material Documentation

The study may provide suggestions as to which information about bow blanks, bow sticks, and existing bows is particularly relevant in professional terms and how it can be recorded transparently.

For Professional Information and Guidance

The findings from Survey Route B may indicate the situations in which professional groups, musicians, or owners require clearer and more readily accessible information on documentation, supporting evidence, and legal marketability under conservation law.

For Differentiated Use of Existing Resources

The investigation may show that practical usability of a bow blank depends on its individual characteristics and intended use. This may support more careful allocation of different material qualities without deriving general statements about material stocks or general yield factors from individual findings.



6.4. Further Research Needs

The study represents a first systematic step towards scientifically recording professional assessment practice. Its results may raise new questions that can be examined in greater depth in further investigations.

These include:

- materials-science investigations of selected characteristics and their relationship to workability, bending behaviour, shape stability, and long-term behaviour;
- comparative investigations of bow blanks and the bow sticks made from them;
- long-term observation of bows with particular material characteristics;
- in-depth investigation of regional and historical differences in assessment standards;
- research into education, knowledge transfer, and transmission of implicit specialist knowledge;
- methodological development of standardised image references and assessment instruments; and
- studies of documentation, access to information, and practical marketability of existing bows.

The present investigation should therefore be understood not as an endpoint, but as a starting point for broader scientific engagement with material assessment, professional expertise, and sustainable resource use in modern stringed-instrument bow making.

6.5. Outlook

The planned study is intended to open a body of knowledge that has hitherto been rooted mainly in workshops, individual experience, and professional networks. It may help document this experiential knowledge without reducing its complexity to simplified indicators or rigid rules.

Its value lies in bringing together several perspectives: the experience of bow makers, the assessment of existing bows by violin makers and dealers, the inclusion of physical material parameters, and the scientifically transparent analysis of this information.

This can create a basis on which future discussions of material assessment, education, documentation, marketability, and sustainable resource use can be conducted with greater professional precision. The research proposal remains open to scientific validation, methodological development, and participation by further specialist partners. It is expressly designed as a collaborative study capable of further development, not as a completed investigation.



7. Work Programme and Planned Project Sequence

The study is designed as a research project to be developed in stages. The present data-collection instrument, image references, and evaluation-oriented research questions provide a sound working basis, but must be scientifically validated, tested in a pretest, and adjusted where necessary before the international survey begins.

7.1. Scientific Validation

In a first step, the research design, data-collection instrument, image references, term definitions, and analytical structure will be reviewed jointly with the scientific cooperation partners.

This validation will also refine the criteria for subsequent analysis. This concerns the conditions under which assessment patterns may be described as broad consensus, tendency, disagreement, or an open question. The final definition will be made after the pretest and before the main analysis begins.

The review will address whether the research questions are clearly operationalised, whether the response scales adequately reflect professional assessment practice, and whether the planned comparisons between professional groups, quality segments, and assessment perspectives can be undertaken in a methodologically robust way.

Attention will be paid to clear distinction:

- between assessment of bow blanks for new making and assessment of finished or existing bows;
- between material-related, functional, and market-related considerations; and
- between these considerations and questions of documentation and legal marketability under conservation law.

These areas are connected in practice but must not be conflated in the analysis.

7.2. Pretest of the Data-Collection Instrument

Following scientific review, a pretest will be conducted with a limited number of professionally experienced participants from different professional groups.

The pretest will examine the comprehensibility of the questions, the unambiguity of terms, the operation of the online routing, and the practical time required for completion. It will also examine whether the standardised image references explain the intended characteristics with sufficient clarity and whether degrees of expression, position information, and quality segments are understood consistently. In addition, it will show whether the available free-text fields and response options are sufficient to capture professional particularities, uncertainties, or context-dependent assessments without impairing the standardised comparability of the survey.

The results of the pretest will be documented. Changes to the structure of the data-collection instrument, terminology, image references, or response formats should be made only on this basis and supported by transparent reasoning.

7.3. Preparation of the International Survey

Before the main survey begins, the final language versions will be prepared and aligned in technical terminology. It must be ensured that key terms carry, as far as possible, the same meaning in all language versions.



This applies to:

- bow blank and bow stick;
- material characteristics and structural irregularities;
- degrees of expression;
- position information;
- quality segments;
- acceptability and assessment scales;
- “Cannot assess” and “Not applicable”; and
- terms relating to documentation, marketability, and Pre-Convention evidence.

In parallel, the technical requirements for the online survey will be reviewed. These include automatic routing to Routing A or Routing B, display of image references, data security, prevention of multiple participation, and separate storage of any contact details for interviews.

7.4. International Field Phase

The international survey will take place after the pretest and technical finalisation have been completed. It is addressed to specialists in bow making, violin making, trade, restoration, and related fields of activity, insofar as their professional experience is relevant to the respective question.

Participants will be approached through professional networks, professional associations, training institutions, personal contacts, and international communication channels. The aim is not a statistically representative random sample, but internationally diverse participation that is professionally robust.

No fundamental changes will be made to core questions or image references during the field phase. Where technical adjustments are required, they will be documented and taken into account in subsequent analysis.

7.5. Data Preparation and Initial Analysis

After the field phase, the data will be structured, cleaned, and prepared for analysis.

First, a descriptive analysis of responses will be conducted. This includes, among other things, frequencies, distributions, differences between quality segments, assessments by degree of expression, and, where provided for, by position of the characteristic within the intended or existing bow stick.

The analysis follows a multidimensional logic:

material characteristic × degree of expression × quality segment × assessment context

For position-dependent questions, the location of the characteristic is included as an additional dimension. Responses such as “Cannot assess” and “Not applicable” are reported separately and are not treated as neutral, negative, or missing responses.

7.6. In-Depth Expert Interviews

On the basis of the initial analysis, topics requiring more detailed professional contextualisation will be identified. This may be the case in particular where clear agreement, substantial dispersion, or response patterns that are difficult to explain methodologically become evident.



The interviews do not serve to correct survey findings retrospectively. They are intended to help understand their professional context more fully. Interview statements will therefore be presented as clearly separate from quantitative results.

7.7. Overall Analysis and Scientific Contextualisation

In the overall analysis, quantitative and qualitative findings will be related to one another. The analysis will examine:

- for which material characteristics broad consensus can be identified;
- where majority tendencies exist without clear consensus;
- for which questions clear disagreement or strongly polarised assessments arise;
- what differences exist between Survey Routes A and B; and
- which questions remain open because of limited data, low case numbers, or high proportions of “Cannot assess” responses.

The criteria for consensus, tendency, disagreement, and open questions will be defined before the main analysis and documented in the analytical framework. Differences between professional groups, regions, or experience profiles will be interpreted in greater depth only where the size and composition of the relevant subsamples permit professionally robust contextualisation.

7.8. Preparation of the Findings

The findings will be prepared in a scientifically transparent form. This includes written presentation of the results, tables, figures, methodological explanations, and, where appropriate, supplementary appendices.

Presentation must ensure that direct findings, professional interpretations, and further recommendations remain clearly separate. The study is intended to document the assessment patterns that become evident within the international professional community. It is not intended to derive binding technical thresholds or universally valid quality standards from them.

7.9. Provisional Timetable

The timetable describes the planned sequence of work. It assumes that scientific cooperation, technical implementation of the online survey, and translations can be prepared within an agreed project period.

The following information is intended as a provisional frame of reference. It may change in particular as a result of scientific validation of the data-collection instrument, the scope of the pretest, the number of available language versions, international participation, and the need for in-depth expert interviews.

Indicative period	Work step	
approximately 2 weeks	Scientific validation of the study design, research questions, data-collection instrument, image references, and proposed analytical framework	✓
app. 2 weeks	Completion and professional alignment of the language versions, together with the required information on consent and data protection	✓



Indicative period	Work step	
app. 2 weeks	Technical implementation of the online survey, including Routing A and Routing B, and testing of automatic continuation to shared question block 4	✓
app. 2 weeks	Pretest with a limited, internationally composed group of specialists	✗
app. 2 weeks	Evaluation of the pretest and methodological, linguistic, and technical revision of the data-collection instrument	✗
app. 4 weeks	International implementation of the online survey	✗
app. 6 weeks	Data preparation, plausibility checks, and initial descriptive analysis	✗
app. 8 weeks	Supplementary expert interviews to contextualise selected findings	✗
app. 6 weeks	Integration and analysis of quantitative and qualitative data	✗
app. 10 weeks	Preparation of the findings, discussion, conclusions, and production of tables, figures, and appendices	✗
App. 8 weeks	Scientific review, revision, final editing, and preparation for publication	✗

Estimated total duration: approximately 52 weeks.

Planning range: approximately 40 to 60 weeks, or around 9 to 14 months.



Completed



Pending



8. Appendix: Online Survey Questionnaire and Technical Routing Structure

The online survey is currently available in preview mode until 31 August 2026. It is designed as a single multilingual data-collection instrument for professional respondents and is available in German, English, Brazilian Portuguese, French, Spanish and Japanese.

All participants first complete the shared entry, consent and professional-profile section. This records their professional perspective, principal country of activity, professional experience, the types of bows with which they work, relevant quality segments and principal fields of activity.

Based on the professional information provided, respondents are automatically directed to the relevant route-specific part of the survey. Participants whose work includes the construction of new bows continue with Routing A, which addresses the selection, assessment and intended use of bow blanks, position-specific evaluation of material characteristics at different severity levels, selection criteria, professional practice and relevant physical properties.

Participants whose work concerns existing bows continue with Routing B. This route addresses the assessment of material characteristics in finished bow sticks, including position-specific ratings of structural features, technical appraisal, condition, repair and restoration considerations, market acceptance, documentation, conservation-law requirements and the legal marketability of existing bows.

Both routes conclude with shared final questions, including space for additional comments, consent to scientific evaluation and the optional provision of contact details for follow-up questions. The following appendices are additionally envisaged for further development of the study:

Appendix C – Catalogue of Evaluation-Oriented Research Questions

Systematic allocation of research questions, guiding assumptions, data-collection fields, and planned analytical steps.

Appendix D – Image References for Material Characteristics

Standardised technical representations and explanatory image references for the anatomical, structural, and visual material characteristics addressed in the survey.

Appendix E – Interview Guides

Semi-structured guides for supplementary expert interviews, organised by professional perspective and thematic focus.

Appendix F – Analysis Framework

Documentation of the planned quantitative and qualitative analytical methods, including the handling of different scale types, small subsamples, free-text responses, “Cannot assess” or “Not applicable” information, and the criteria for consensus, tendency, disagreement, and open questions to be defined before the main analysis.

Appendix G – Supplementary Tables on Physical Properties

Compilation of data collected within the study and supplementary information on density, modulus of elasticity, speed of sound, weight, balance point, and other relevant parameters.

Appendix H – Glossary

Definitions of bow blanks, bow sticks, material characteristics, quality segments, positions, and assessment terms.

Appendix I – Technical Terminology List

Multilingual compilation of the technical terms used to ensure consistent terminology across the study’s different language versions.